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Horizon® Multi-media Dry Imager

Technical Manual

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Preface

Conventions Used in This Manual

Bulleted Lists

Bullets are used to display a list of nonprocedural items. For example:

The control panel contains:

- A display panel
- Keys
- Indicators

Numbered Steps

The icon indicates the beginning of a procedure. The steps in a procedure are numbered. For example:

To access the Main Menu and scroll through menu options

1. Press the MENU key.

   The Main Menu displays on the control panel. The selector arrow (▶) automatically points to the first menu option.

2. To scroll through the menu options, press the ▲ and ▼ keys.

   The selector arrow (▶) moves up and down through the list. The bottom portion of the control panel display shows a message associated with the currently selected menu option.

Control Panel Navigation

Menu paths are used in some procedures instead of documenting every step needed to navigate to a specific menu option. For example:

From the Main Menu, select the following options:

Default Media
Grayscale
DV Film Blue

Control Panel Keys

Control panel keys are shown in small black ovals to resemble the actual keys, for example, "Press the ENTER key."

Control Panel Menu Options

Control panel menu options are shown in bold type, for example, "Select the **Gamma** menu option."

Notes and Tips

Notes contain additional information related to a topic or procedure. For example:

NOTE: *If your network is managed by a network administrator or an information technology (IT) department, it would be considered a complex network. You should have the responsible person perform any network-related administrative tasks.*

Tips provide additional insights about a topic or procedure (such as, why you may want to do something or a faster way to perform an operation). For example:

TIP: Specifying print settings in a multi-user environment
If the Horizon imager is accessed by multiple users, it is typically better for individual users to enter print values through the DICOM application interface rather than change the default settings through the control panel.

Cautions and Warnings

Cautions alert you to actions or situations that could cause harm to equipment or data. For example:

CAUTION Any changes you make to the imager default settings will also affect prints made by other users. Use caution when changing default settings.

Warnings alert you to actions or situations that could result in personal injury. For example:

WARNING With the imager cover open, touch only those internal components that are colored green.

Text Files and Displayed Text

`Monospaced type` is used for the contents of an ASCII file or machine text displayed in a terminal command window.

User Data

`Bold monospaced type` is used to indicate specific characters or words that you enter at a host workstation when performing advanced imager operations. ***`If the type is also italicized`***, it indicates variable text. For example:

To query imager status using Telnet

1. From your workstation, open a UNIX or MS-DOS command window.
2. Enter the command **`telnet`** ***`hostname`*** or **`telnet`** ***`IP Address`*** (using either the Horizon imager hostname or IP Address).
3. At the login prompt, enter the command **`status`**.

Important Information and Filenames

Bold type is used for emphasis, command names, and paths or filenames. For example:

- The Horizon imager default settings can be changed both at the control panel and using text files.
- The hostname and IP Address must be added to the **/etc/hosts** file.

New Terms

Italic type is used when a term is introduced and defined. For example:

- The Horizon imager has a complete set of *default settings* that contain preconfigured values for every aspect of a printed sheet.

Purpose and Scope

Refer to this Technical Manual for procedures on how to perform advanced imager operations, including:

- Specifying network settings for complex networks
- Specifying general imager preference settings
- Configuring support for DICOM printing
- Configuring support for non-Windows PostScript printing
- Understanding job, sheet, and image parameters
- Understanding media selection
- Creating, managing, and using User Settings files
- Creating, managing, and using Job Settings files
- Using Horizon logical devices to print scaled and unscaled single images, and to print sheets using Fixed Multiformatting™ (FMF™), Variable Multiformatting™ (VMF™), and the 35mm SlideMaker™
- Sending print jobs using FTP and LPR
- Printing images stored on backup media
- Specifying and enabling the use of captions
- Using Bracketing™ to achieve a desired image appearance
- Enabling feature keys
- Reinstalling and updating software stored on installation media
- Using backup media for copying configurations from one imager to another
- Using the Horizon Smart Card to move the imager's settings and information to another Horizon imager

- Viewing detailed information about the imager's current state, and working with log files

NOTE: *This manual is current to the Horizon imager v3.0.0 software. Some features and functions described here may not apply to older versions of the software.*

If you need information on Horizon basic operations (for example, navigating the control panel) or how to perform day-to-day operations, refer to the *Horizon Imager User's Manual* (Catalog no. HORIZON MNLU). The User's Manual serves as a companion document to this manual.

Product Information

For information about Codonics products and prices, call the Codonics "On Call" Technical Support System at the following number:

Phone: 440-243-1198

The "On Call" Technical Support System provides for around-the-clock availability of qualified technical support personnel.

General product information can also be requested by sending e-mail to:

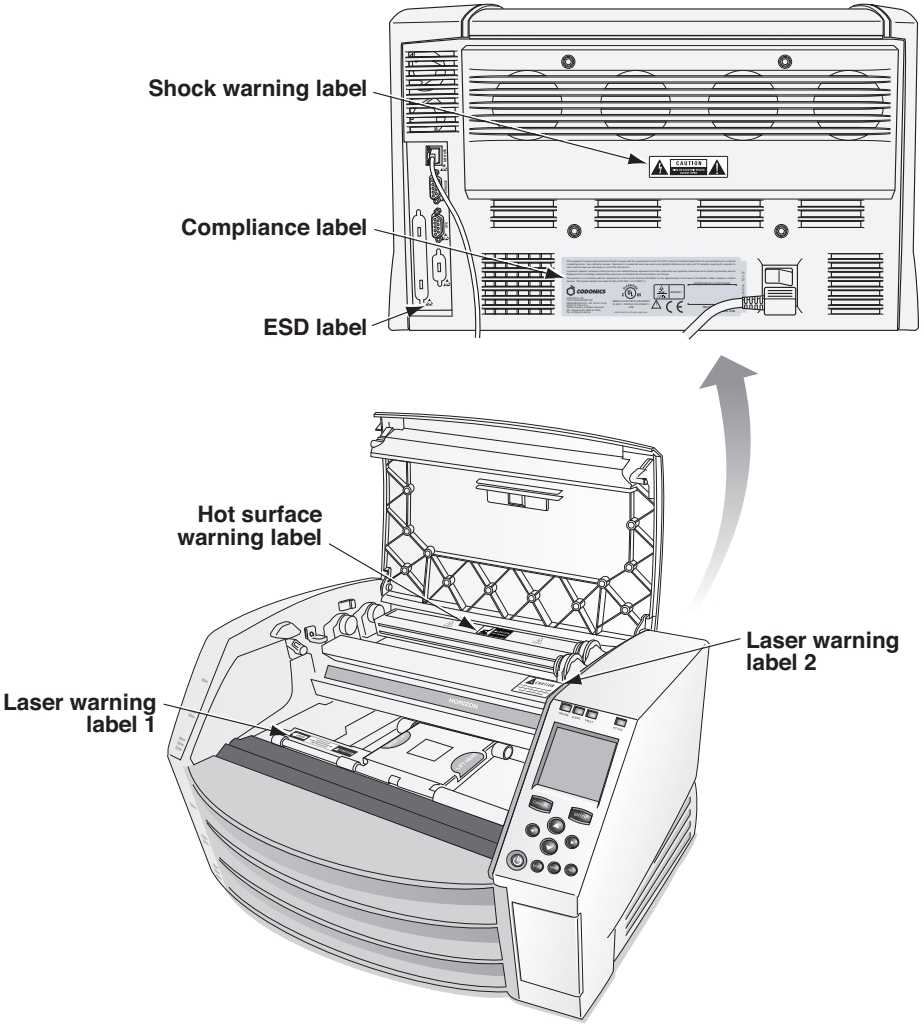
info@codonics.com

Please include your postal mailing address and telephone number in the e-mail message. Basic product information is returned via e-mail. Complete product literature and sample prints are sent by postal mail.

Warnings and Limitations of Use

Location of Safety and Compliance Labels

The following figure shows the locations of the imager's safety and compliance labels.



Voltage Warning

The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying this imager.

NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL. REMOVAL OF LABELS, COVERS, OR ENCASEMENT FASTENERS VOIDS THE WARRANTY.

THIS APPARATUS MUST BE ELECTRICALLY GROUNDED.

TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS IMAGER TO RAIN OR MOISTURE.

EQUIPMENT IS NOT TO BE USED AS A COMPONENT OF A LIFE SUPPORT SYSTEM. Life support devices or systems are devices or systems that support or sustain life, and whose failure to perform can be reasonably expected to result in a significant injury or death to a person. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

WARNING Grounding reliability can be achieved only when the Horizon is connected to a receptacle marked "Hospital Only" (that is, "Hospital Grade").

WARNING The power cord connected to the Horizon is the main disconnect for the system.

WARNING To disconnect overall power to the Horizon prior to servicing it, power off the system (refer to the *Horizon Imager User's Manual* for procedures on how to power off the imager).

Dangers Electriques

L'éclair fléché dans un triangle équilatéral, est destiné à alerter l'utilisateur de la présence d'une "tension dangeros" dans l'enceinte du produit qui peuvent être d'une ampleur suffisante pour constituer un risque de choc électrique.

Le point d'exclamation situé à l'intérieur d'un triangle représente un point d'instruction important dans l'utilisation ou l'entretien de cette appareil.

AUCUNE PIECE N'EST REPARABLE PAR L'UTILISATEUR. POUR SOUTIEN ADRESSEZ-VOUS AU PERSONNEL QUALIFIE. LE RETRAIT DE LES ETIQUETTES, LES COUVERTURES, OU LES ATTACHES PEUT ANNULENT LA GARANTIE.

CET APPAREIL DOIT ETRE ELECTRIQEMENT RELIE A LA TERRE.

N'EXPOSEZ PAS CET APPAREIL À LA PLUIE OU L'HUMIDITÉ, EN RAISON DU RISQUE DE FEU OU DE DÉCHARGES ÉLECTRIQUES.

Cet appareil ne doit pas être utilisé comme composant d'un système d'assistance vitale. Les devis ou les systèmes vitale sont quelque devis ou système qui assistent ou soutiennent la vie, et si les devis ou systèmes échouent, on peut attend raisonnablement la mort ou la blessure. Cet appareil ne doit pas être utilisé dans des conditions où la défaillance de l'appareil pourrait entrainer la blessure ou la mort de quelqu'un.

ATTENTION Une mise à la terre fiable est possible seulement pendant que le Horizon est connecté aux appareils marqué "Hospital Only" (de qualité hositalière).

ATTENTION Le fil électrique connecté à le Horizon est le système de coupure principal de l'appareil.

ATTENTION Pour débrancher le fil électrique avant le soutien, se déconnecter et puis éteint le système (renvoyer à " Powering Off the Imager " sur la page 3-9).

Laser Warning

The Horizon imager uses a laser to read barcode information on the media cassettes. The laser module is a 650 – 670-nm device of 1.26 mW or less. As such it has been found to comply with the 21 CFR 1040.10 and 1040.11 and IEC 60825 laser standards as a low power Class 1 device.

For safety reasons, the laser is turned on only for a short time when a cassette is inserted. Still, one should use caution and never stare at the laser beam, should avoid exposure to the laser, and should never override any of the interlocks and safety mechanisms. These measures are taken for your protection.

WARNING Use of controls or adjustments to the performance of procedures other than those specified in this manual may result in hazardous radiation exposure.

The laser apertures are marked with a single label, shown below. There are three apertures that correspond to the three cassette locations, one for each, on the same side of the Horizon imager as this label.

Safety interlocks are marked by the following label. They are located on the same side of the Horizon imager as this label.

The locations of the two laser labels are shown in the figure on page xxi.

Dangers au Laser

L'imageur Horizon utilise un laser pour lire les informations de codes à barres sur les cassettes des médias. Le module laser est un appareil 650 à 670 nm de 1,26 MW ou moins. Comme tel, il a été jugé conforme à la norme CFR 21 1040.10 et 1040.11 et les normes IEC 60825 comme un laser de classe 1 de faible puissance appareil.

Pour des raisons de sécurité, le laser est activé uniquement pour une courte durée quand une cassette est insérée. Pourtant, on devrait faire attention et de ne jamais regarder le faisceau laser, devrait éviter l'exposition au laser, et ne doit jamais remplacer l'un des verrouillages et des mécanismes de sécurité. Ces mesures sont prises pour votre protection.

ATTENTION L'utilisation de commandes ou de réglages à l'exécution de procédures autres que celles spécifiées dans ce manuel peut entraîner une exposition à des radiations dangereuses.

Les ouvertures laser sont marqués d'une étiquette unique, illustré ci-dessous. Il ya trois ouvertures qui correspondent aux trois endroits cassette, une pour chacun, sur le même côté de l'imageur Horizon que cette étiquette.

Verrouillages de sécurité sont marqués par l'étiquette suivante. Ils sont situés sur le même côté de l'imageur Horizon que cette étiquette.

Les emplacements des deux étiquettes laser sont présentés dans la figure sur page xxi.

Temperature Warning

Because the Horizon imager is a thermal print device, the surface of the thermal print head heat sink gets hot. Avoid directly touching any components not colored green when accessing the interior of the imager if the imager has been printing. (During some preventative maintenance tasks, you will be touching internal components with cleaning pads or swabs.)

The temperature warning label is shown below.

Dangers Température

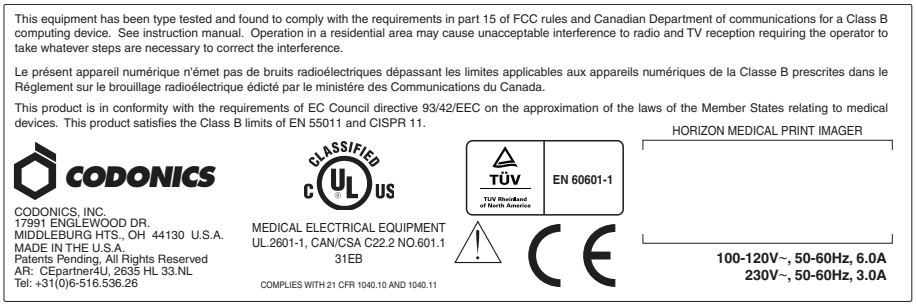
Parce que l'imageur Horizon est un appareil d'impression thermique, la surface du dissipateur de chaleur de tête d'impression thermique est chaud. Évitez de toucher directement des composants non colorés en vert lors de l'accès à l'intérieur de l'imageur, si l'imageur a été en usage. (Au cours de certaines tâches d'entretien préventif, vous serez toucher les composants internes avec des tampons de nettoyage ou de tampons.)

L'étiquette d'avertissement de température est indiqué ci-dessous.

Compliance

Codonics is in compliance with various regulations, of which details are listed in the *Horizon Imager User's Manual*.

The Compliance label, which is affixed at the back of the imager, is shown below.


This equipment has been type tested and found to comply with the requirements in part 15 of FCC rules and Canadian Department of communications for a Class B computing device. See instruction manual. Operation in a residential area may cause unacceptable interference to radio and TV reception requiring the operator to take whatever steps are necessary to correct the interference.
Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la Classe B prescrites dans le Réglement sur le brouillage radioélectrique édicté par le ministére des Communications du Canada.
This product is in conformity with the requirements of EC Council directive 93/42/EEC on the approximation of the laws of the Member States relating to medical devices. This product satisfies the Class B limits of EN 55011 and CISPR 11.
HORIZON MEDICAL PRINT IMAGER
CODONICS
CODONICS, INC.
17991 ENGLEWOOD DR.
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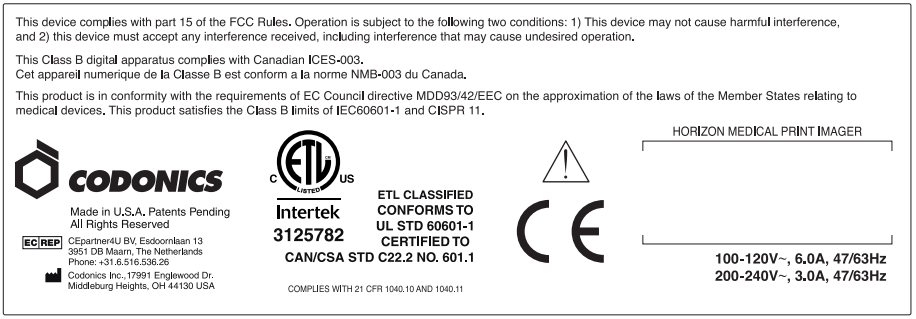
Tel: +31(0)6-516.536.26
CLASSIFIED
C UL US
MEDICAL ELECTRICAL EQUIPMENT
UL.2601-1, CAN/CSA C22.2 NO.601.1
31EB
COMPLIES WITH 21 CFR 1040.10 AND 1040.11
TÜV
TUV Rheinland of North America
EN 60601-1
100-120V~, 50-60Hz, 6.0A
230V~, 50-60Hz, 3.0A

Compliance label — Horizon with Zip drive

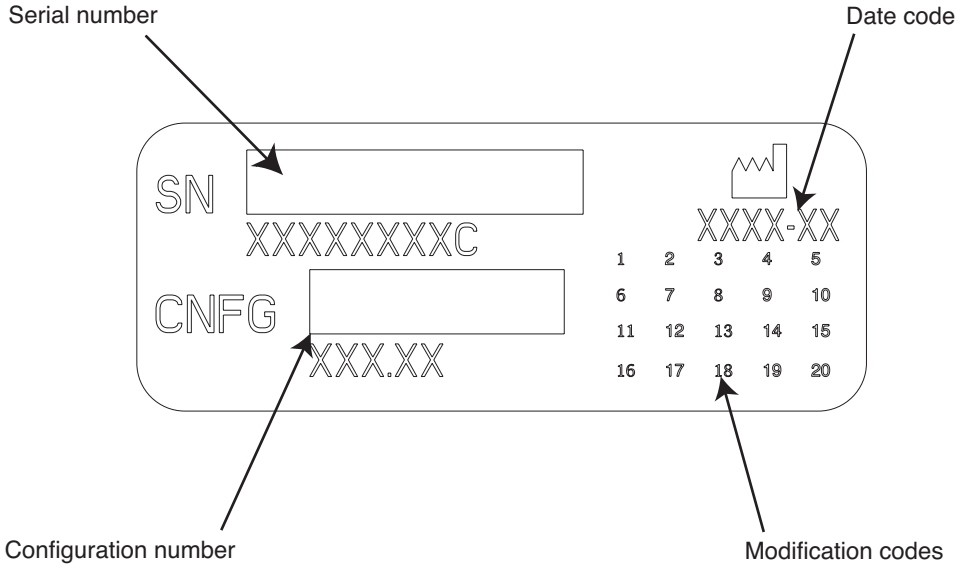

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: 1) This device may not cause harmful interference, and 2) this device must accept any interference received, including interference that may cause undesired operation.
This Class B digital apparatus complies with Canadian ICES-003.
Cet appareil numerique de la Classe B est conform a la norme NMB-003 du Canada.
This product is in conformity with the requirements of EC Council directive MDD93/42/EEC on the approximation of the laws of the Member States relating to medical devices. This product satisfies the Class B limits of IEC60601-1 and CISPR 11.
HORIZON MEDICAL PRINT IMAGER
CODONICS
Made in U.S.A. Patents Pending
All Rights Reserved
EC REP
CEpartner4U BV, Esdoornlaan 13
3951 DB Maarn, The Netherlands
Phone: +31.6.516.536.26
Codonics Inc., 17991 Englewood Dr.
Middleburg Heights, OH 44130 USA
C ETL US
LISTED
Intertek
3125782
ETL CLASSIFIED
CONFORMS TO
UL STD 60601-1
CERTIFIED TO
CAN/CSA STD C22.2 NO. 601.1
COMPLIES WITH 21 CFR 1040.10 AND 1040.11
100-120V~, 6.0A, 47/63Hz
200-240V~, 3.0A, 47/63Hz

Compliance label — Horizon with no Zip drive

Serial Number, Configuration, Date Code, and Modification Codes

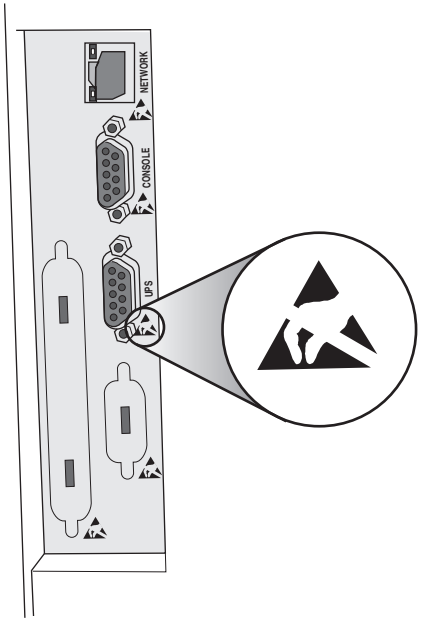
The Serial number label is placed onto the Compliance label. It includes the following information.

- The serial number (SN), which uniquely identifies the unit.
- The Configuration number (CNFG), which details the build configuration.
- The modifications codes, which are to the right of the CNFG number and are a series of 20 numbers. When any of these numbers are blocked out, that identifies a modification that was made to the unit.
- The date code in YYYY-MM format below the factory date code symbol.

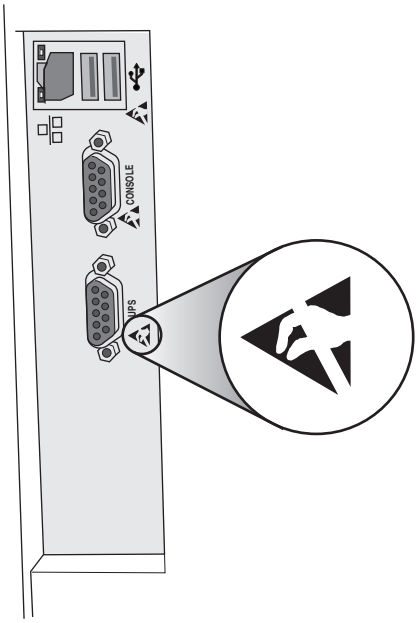


ESD Caution

Connections to other pieces of equipment are made at the rear of the Horizon imager. These connectors are marked with a precautionary ESD warning symbol, as shown below. Do not touch any of the pins of these connectors. When making connections to the imager, it is best done while the imager is plugged in but not powered on. ESD may cause erratic behavior of the imager when powered on. Should this occur, power to the imager may have to be cycled. It is recommended that all staff involved in making connections to the imager be aware of these ESD precautions.



Rear panel — Horizon with Zip drive



Rear panel — Horizon with no Zip drive

Potential for Radio Frequency Interference on Imager Operation

Both portable and mobile RF communications equipment can affect medical electrical equipment, including the Horizon imager. Keep such RF communications equipment out of the immediate area.

Potential for Radio and Television Interference

The Horizon imager generates and uses radio frequency energy, and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with Class B emission limits for a computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operating in a commercial environment. Operation of the equipment in a residential area is likely to cause interference, in which case the user, at his own expense, will be required to take whatever measures may be appropriate to correct the interference. If your imager does cause interference to radio or television reception, you are encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna
- Relocate the imager with respect to the receiver

If necessary, you should consult Codonics technical support or an experienced radio/television technician for additional suggestions. You may find the following booklet prepared by the Federal Communications Commission helpful: *How to Identify and Resolve Radio-TV Interference Problems*. This booklet is available from the U.S. Government Printing Office, Washington, D.C. 20402, Stock No. 004-000-00345-4.

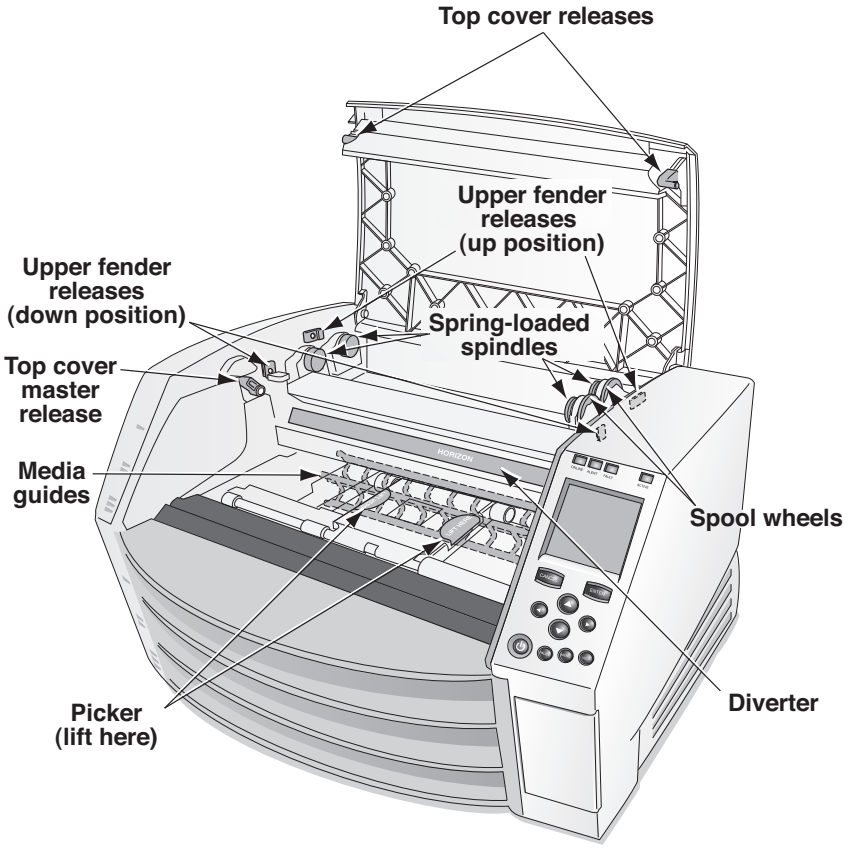
Le présent appareil numérique n'émet pas de bruits radio-électriques dépassant les limites applicables aux appareils numériques de la Classe B prescrites dans le Réglement sur le brouillage radioélectrique édicté par le ministére des Communications du Canada.

This product is in conformity with the requirements of EC Council directive MDD93/42/EEC on the approximation of the laws of the Member States relating to medical devices. This product satisfies the Class B limits of IEC60601-1 and CISPR 11. A declaration of conformity with the requirements of the Directive has been signed by the Director of Operations. Horizon is approved for export via FDA Certificates to Foreign Government and registered as a medical device for import. A current list of countries is available on request.

Safety Precautions

- Never connect this imager to any outlet or power supply that has a voltage or frequency different than that specified on the rear of the imager.
- When servicing the imager, always power it off using the ⏻ (power) key at the control panel, then turn the rocker switch in the back to the **0** (off) position, then unplug the imager.
- Damage to the power cord may cause fire or shock hazard. When unplugging the power cord, hold it by the plug only and remove the plug carefully.
- If the power cord needs to be replaced, replace it only with another Codonics power cord manufactured specifically for your imager's power configuration.
- If the imager is smoking or making unusual sounds, power off and unplug the imager immediately.
- Do not insert foreign objects of any kind into the imager; doing so can constitute a safety hazard and cause extensive damage.

- Do not place any liquid containers on the imager. If, for some reason, liquid seeps into the imager, power off the imager and unplug the power cord from the source outlet. If used without corrective measures, the imager may be damaged.
- Do not use the imager near flammable gases.
- With the imager top cover open or the receive trays removed, touch only those internal components that are colored green (shown in the following figure). Remove rings, ties, jewelry, and other items, and tie back hair, so that they do not fall into or get caught in the imager.

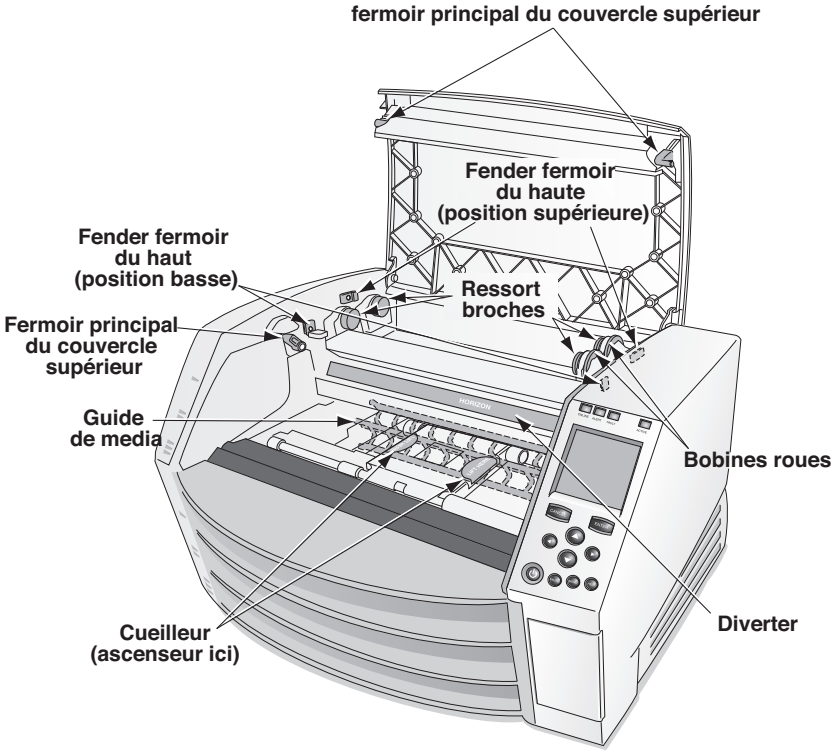


Internal Components That Are Colored Green (called out in the illustration) Are Safe to Touch

Précaution d'Emploi

- *Ne connectez jamais cet imageur à une prise ou d'alimentation qui a une tension ou une fréquence différente de celle indiquée à l'arrière de l'imageur.*
- *Lors de l'entretien de l'imageur, toujours l'éteindre à l'aide de la touche ⏻ (power) à partir du panneau de contrôle, puis tournez le commutateur à bascule à l'arrière pour le* **0** *(off), puis débranchez l'imageur.*
- *D'endommager le cordon d'alimentation peut provoquer un incendie ou d'électrocution. Lorsque vous débranchez le cordon d'alimentation, tenez-le par la fiche et retirez le bouchon avec précaution.*
- *Si le cordon d'alimentation doit être remplacé, il ne remplacer que par une autre cordon d'alimentation Codonics fabriqués spécialement pour la configuration de la puissance de votre imageur.*
- *Si l'imageur est fumeur ou en faisant des sons inhabituels, éteignez et débranchez l'imageur immédiatement.*
- *Ne pas insérer d'objets étrangers dans l'imageur; cela peut constituer un danger pour la sécurité et de causer des dommages importants.*
- *Ne pas placer de récipients de liquide sur l'imageur. Si, pour quelque raison, liquide pénètre dans l'imageur, éteignez l'imageur et débranchez le cordon d'alimentation de la prise source. S'il est utilisé sans mesures correctives, l'imageur peut être endommagé.*
- *Ne pas utiliser l'imageur à proximité de gaz inflammables.*

- *Avec le couvercle ouvert ou les plateaux reçoivent retiré, ne touchez que les composants internes qui sont colorés en vert (montré dans la figure suivante). Enlever les bagues, cravates, bijoux et autres objets, et s'attacher les cheveux, afin qu'ils ne tombent pas dans ou à se coincer dans l'imageur.*



Les composants internes qui sont colorés en vert (marque dans l'illustration) sont sûre au toucher

Location Precautions

- The imager's operating ambient temperature range is 15–30°C (59–86°F), with a relative humidity of 10%–80%.
- If the imager is moved quickly from an extremely cold place to a warmer one, condensation is likely to form. Do not use the imager if condensation has formed. Wait until the condensation has evaporated. You can speed up the evaporation time by moving the imager to a dryer location.
- Ventilation slots and holes are provided on the sides and rear of the imager. Place the imager on a hard level surface and locate it at least 10 cm (4 in.) from walls to ensure proper ventilation.

CAUTION Adequate ventilation is required for proper operation of the imager.

- Do not place imager in a high humidity or high dust area. Airborne dirt particles can cause image quality problems. Avoid placing the imager in areas where ventilation ducts, open doors, or frequent passers-by might expose the imager and media to high levels of debris.
- Do not locate the imager in hot-springs areas where hydrogen sulfide and acidic ions are likely to be generated.
- Do not locate the imager where there are oily fumes and vapors.
- Do not locate the imager in direct sunlight.
- Do not locate imager near sources of high RF energy.
- Do not locate the imager where it might be subject to jarring or vibrations, such as a table or desk in a high-traffic area. Jarring and vibrations can affect the print quality of images.
- Horizon satisfies the electrical safety limits of IEC60601-1 and CISPR 11 and is suitable for patient care area location. Check with local ordinances and installation guidelines to confirm approved location requirements.

Environnement de Fonctionnement

- *Les conditions normales d'utilisation de l'appareil sont : une température de 15 à 30°C et une humidité relative de 20 % à 80 %.*
- *En cas de variation rapide de la température, de la condensation peut se former. En ce cas la n'utilisez pas l'appareil, attendez que la condensation se soit évaporée. Vous pouvez accélère cette évaporation en déplacent l'appareil dans un endroit sec.*
- *Fentes de ventilation et les trous sont prévus sur les côtés et l'arrière de l'imageur. Placez l'imageur sur une surface plane et dure et de le localiser au moins 10 cm (4 po) du mur pour assurer une bonne ventilation.*

ATTENTION Une ventilation adéquate est nécessaire pour le bon fonctionnement de l'imageur.

- *Toujours placez l'appareil dans une zone propre et non-humide. Des particules de poussières peuvent causer des disfonctionnements de la qualité d'imprimante. Évitez de placer l'appareil à proximité d'une bouche de ventilation, d'une porte, ou d'un endroit très fréquenté car cela pourrait exposer l'appareil ainsi que les étiquettes à la poussière.*
- *Ne placez pas l'appareil à proximité d'une source de chaleur ou de substances acides.*
- *Ne placez pas l'appareil dans une endroit où il y a des vapeurs huileuses et grasses.*
- *N'exposez pas l'appareil à la lumière directe du soleil.*
- *Ne placez pas l'appareil près d'une source haute fréquence.*
- *Ne placez pas l'appareil dans un lieu où il pourrait être exposé à des vibrations, car cela peut nuire l'impression des média.*

- *Horizon satisfait aux limites de sécurité électrique de la norme IEC60601-1 et CISPR 11 et est adapté à l'emplacement des soins du patient. Vérifiez avec les ordonnances locales et les directives d'installation pour confirmer les exigences endroit approuvé.*

Cleaning Precautions

- Many plastic components are used in the imager's construction. Coat flecking and deformation is likely to occur if the imager is wiped with chemical dusters, benzene, thinners, insecticides, or other solvents. Rubber and PVC materials left in contact with the imager for extended times will cause damage. Never use petroleum-based solutions or abrasive cleaners.
- To clean the imager cover, first power off the imager using the ⏻ (power) key at the control panel, then turn the rocker switch in the back to the **0** (off) position, then unplug the imager. Clean the cover with a soft cloth slightly moistened with a mild soap and water solution. Allow the cover to completely dry before operating the imager again.

Précautions d'Entretien

- *Il y a beaucoup des choses plastiques utilisant avec la fabrication de l'imageur. L'emploi des chiffons chimiques, de benzène, des diluants, des insecticides, ou des autres solvants peuvent causer les dommages à l'extérieur ou les déformations. Le caoutchouc ou le PVC qui ont beaucoup de contact avec l'imageur causeront les dommages. N'utilisez jamais les nettoyeuses avec pétrole ou les nettoyeuses abrasives.*
- *Pour nettoyer la couverture d'imageur, première éteignant l'imageur en utilisant la touche ⏻ (alimentation) au panneau de contrôle, puis tournez l'interrupteur à bascule à l'arrière au 0 (OFF) position, puis débranchez l'imageur. Nettoyez le couvercle avec un chiffon doux légèrement humidifié avec une solution de savon doux et d'eau. Laisser la couverture de sécher complètement avant d'utiliser l'imageur à nouveau.*

Media

- For **ChromaVista**® color prints, the consumed ribbon contains facsimiles of any patient images printed to **ChromaVista** color sheets. Therefore, you must properly dispose of or destroy consumed ribbon to ensure the confidentiality of patient images.
- The optical density of reflective and transmissive prints have a nominal range of: Dmin = 0.10 OD (reflective), 0.11 OD (transmissive) to Dmax = 2.10 OD (reflective), 3.1 OD (transmissive). Actual optical densities may vary based on media variations and on the instrument being used to measure density. For example, **DirectVista**® Clear film may have a lower Dmin and Dmax than **DirectVista** Blue film.
- The Horizon imager includes a built-in densitometer. The built-in densitometer is designed to produce consistent prints by compensating for variation from one film cassette to another and one imager to another. For applications that require absolute control of the maximum density, the results should be checked against a bench-top commercial densitometer. The internal densitometer can be calibrated to a desktop unit. Refer to Chapter 19 for more information.
- **DirectVista** media is optimized for grayscale prints, while **ChromaVista** is optimized for color prints. If **ChromaVista** is not giving you satisfactory results with grayscale images, you may want to consider using **DirectVista** media for those applications.
- Media variations between different production lots may produce subtle differences in image quality and color. These variations most often occur in color ribbons and are characterized as a slight color hue in grayscale images.
- Codonics film media is designed to be viewed using a light box suitable for viewing medical diagnostic images.
- Codonics paper/white film media is designed to be viewed under cool-white, fluorescent light. Spectral differences and intensity variations in the viewing light sources can change the apparent color of images printed on paper/white film.

- Printed images that are subject to prolonged exposure to sunlight, ultraviolet light, or extreme heat may degrade in image quality. (For example, printed sheets should not be stored in an automobile on a sunny day.) Precautions should be used to avoid prolonged direct exposure.

Codonics Paper/White Film Media

The terms “white paper” and “white film” are synonymous references and used interchangeably in this manual.

File Transfer via FTP and LPR

- Different users who share a user name when transferring files to the imager may cause unpredictable and erroneous printed output. The imager associates information with the user name. Each user should have a unique user name when connecting to the imager via FTP and LPR.

Color Management

- Image settings—including gamma, contrast, Dmax, saturation, and MCM™ (Medical Color Matching™)—are intended to compensate for differences that may occur between image acquisition and image printing. These filters allow you to accurately render the final printed image. You should use care when applying these filters to avoid over compensation.
- The Default User Settings set at the control panel will potentially affect prints made by all users. Use caution when changing the default settings.

Image Scaling

- Scaling an image will filter the original image data and add or remove information, which may affect the accuracy of the final printed image. The amount of information added or removed will also vary with the magnitude of the scale factor applied. This can also affect the accuracy of the final printed image. You should be aware of the properties and limitations of each scaling algorithm and select the appropriate algorithm for the task.

Hardware Variations

- Components used in the imager may vary, causing differences in image quality. The thermal process of producing a print utilizes many components that are calibrated to provide consistency between imagers. There are subtle differences between imagers that can cause print variations. These differences usually apply to thermal print head calibration. Other factors such as age, usage, heat, mechanical wear, and shipping can affect image color and quality.
- The type of media used to install software updates and to backup imager configuration settings depends on hardware variations. If the imager has a built-in Zip drive, installations and backups are performed using 100-MB Zip disks. If the imager does not have a built-in Zip drive, USB flash drives are used with the USB ports on the rear panel. Throughout this manual, Zip disks and USB flash drives are referred to as *installation media* or *backup media*, depending on the operation being performed.

NOTE: *If the imager has both a ZIP drive and a USB port, always use the ZIP disk to install software and save configuration settings.*

Disposal Requirements

Disposal of this product and consumables shall be in accordance with all applicable laws and regulations in effect at the locality at the time of disposal.

Conditions et Règles d'Utilisation

L'utilisation de ce produit doit être conforme à toutes les lois et règlements applicables sur le lieu d'utilisation.

European Disposal Requirements

Codonics imagers and electronic accessory devices are not to be discarded or recycled; rather they are to be returned to the manufacturer. Contact Codonics directly or by the link provided for the latest information concerning:

- Identification of the country-specific Importer/Distributor/Producer
- Product return and treatment of our electronic products

Manufacturer: Codonics Inc.
17991 Englewood Drive
Middleburg Heights, OH 44130 USA
Phone: +1 440.243.1198
Fax: +1 440.243.1334
E-mail: WEEE@codonics.com
www.codonics.com

Codonics electronic products and accessories bearing the following symbol are subject to European Directive on Waste Electrical and Electronic Equipment (WEEE) 2002/96/EC, amended by Directive 2003/108/EC. The EN 50419 symbol indicates separate collection and return required.

EN 50419 symbol

Indications for Use

CAUTION Approved FDA Class 2 device - Federal law restricts this device to be sold for use by or on the order of a physician.

The intended use of the Horizon Series Imagers is high-resolution hardcopy imaging of digital image source material and through the conversion of electronic signals from a wide variety of direct/indirect medical imaging modality outputs. The hardcopy output includes, however is not limited to, digital radiography, nuclear medicine, ultrasound, CT, MRI, CR, and Radiation Therapy planning. Images are suitable for medical image diagnosis use and referral. The system is intended for use by medical radiologists, imaging modality specialists, and communications to referring physicians.

The Horizon Series Imagers are dry, thermal, grayscale (G, GS,GS-s,GS-Rad, G1, and G2 models) and grayscale/color (Ci, Ci-s, Ci-RAD, and SF models) direct thermal printer/imagers.

The Horizon XL is a special model adding 14 x 36-in. and 14 x 51-in. true size “long” media that permits digital direct orthopaedic application hardcopy, including diagnosis and analysis of scoliosis, weight bearing spine/hip/knee, and long bone/hip prosthetic and orthopedic appliances work-up and surgical planning. Horizon XL is applicable to true-size hardcopy of whole body CT, MRI, and Angiographic and Venous flow imaging procedures.

Horizon Imagers are 510(k) cleared to market as FDA Class 2 devices, Regulation number 892.2040, Classification Product Code LMC: Horizon Series Medical Multimedia Dry Imagers K021054 and Horizon XL Medical Long Film Imager Hardcopy Multimedia K060440.

1 Introduction

Welcome and Congratulations

Congratulations on your purchase of the Horizon Multi-media Dry Imager—the most compact, versatile imager in the world!

We are pleased you chose the Horizon imager from Codonics. We are confident that your new imager will provide fast, reliable printing for your demanding imaging applications. The Horizon imager is capable of printing images with outstanding clarity and detail.

Note that there are several models of the Horizon imager, each with different features. This manual describes all of the available features, so some may not apply to your model.

Imager Features

State-of-the-Art Printing Technology

Codonics **DirectVista** grayscale paper/white film and film, and **ChromaVista** color paper/white film, are state-of-the-art imaging media that are ideally suited to CT (computed tomography), MRI (magnetic resonance imaging), digital radiography, fluoroscopy, PACS (picture archiving and communication system), ultrasound, nuclear medicine, portable X-ray, mammography, dental, and other imaging applications.

DirectVista grayscale direct thermal technology produces stunning, diagnostic-quality grayscale prints without the need for chemicals or ribbons.

The unique **ChromaVista** color dye-diffusion process transfers dyes from a multi-patch color ribbon onto specially coated paper/white film. Different levels of heat are used to regulate how much dye is transferred. The paper/white film is precisely registered in the imager so that it stays aligned during each pass, resulting in diagnostic-quality color prints. As an added benefit, you do not have to remove the color ribbon when printing to **DirectVista** grayscale media.

Small Footprint

The small footprint of the Horizon imager makes it ideal for desktop applications, allowing it to be located close to a user's workspace. Its size and weight also make the imager ideal for mobile applications.

Wide Variety of Media Types and Sizes

The Horizon imager supports output to paper/white film and film media in a wide variety of sizes. For a complete list, refer to Appendix A.

Easy Access from a Variety of Image Sources

The Horizon imager can print extraordinary images from a variety of image sources, including:

- **DICOM Print Service Class-compliant image capture or viewing applications.** This option is explained in the *Horizon Imager User's Manual*.
- **Windows and Macintosh applications via PostScript.** This option is explained in the *Horizon Imager User's Manual*.
- **FTP and LPR.** Support for these sources comes standard with the imager. FTP and LPR are considered advanced printing methods, typically used by system integrators and only with UNIX applications. They are fully explained in Chapters 10 and 11.
- **Backup media (either a 100-MB Zip disk or a USB flash drive).** This option is explained in Chapter 12.
- **Codonics SA-2000 Analog Framegrabber.** Instructions for using the SA-2000 are explained in the *SA-2000 Operator Manual*.

Via its TCP/IP–Ethernet connection, the Horizon imager can support printing requests coming simultaneously from multiple devices on the network:

- DICOM (up to 24 simultaneous connections)
- DICOM Lite 1 (1 simultaneous connection)
- DICOM Lite 2 (1 or 2 simultaneous connections)
- PostScript (up to 11 simultaneous connections)

- FTP (up to 12 simultaneous connections)
- LPR (up to 11 simultaneous connections)

NOTE: *The number of connections may vary, depending on the imager features that you purchased.*

Support for Major Image File Formats

The Horizon imager supports printing images that are in the following image file formats:

- DICOM (including DICOM images submitted via FTP or LPR)
- PostScript
- TIFF
- BMP
- GIF
- JPEG (JFIF and Exif subtypes)
- PNM
- PNG
- DEFF (considered a variant of TIFF)
- PCX
- Sun Raster (RAS)
- SGI
- TGA
- XWD

Note that your particular configuration of the imager may not include all of the format types listed above. If your imager does not support an image file format that you need, contact your Codonics representative.

Image Formatting and Enhancement Capabilities

The Horizon imager offers powerful image processing capabilities:

- Image conversion, image scaling, and grayscale and color management are performed by a high-performance Intel processor.
- The Horizon imager eliminates the pixelation often seen when enlarging images by using sophisticated scaling algorithms such as Lanczos, Bilinear, Bicubic, and Mitchell. These scaling techniques provide flexibility for applications from medical imaging to photo reproduction.
- Image processing can be controlled through default image and sheet settings, custom settings entered from DICOM applications, in PostScript print settings, or settings associated with a selected Job Settings file. This provides maximum flexibility of output for each user accessing the imager.
- The Horizon imager will produce diagnostic-quality images with an optical density of 3.0 or greater on **DirectVista** grayscale film.

Adding Captions to Printed Sheets

Custom images can be installed in the imager for use as captions, which are added to a sheet when it is printed. This feature can be enabled and disabled for each user. For more information, refer to Chapter 13.

Easy Feature Upgrade

The imager can be easily upgraded to support additional features by entering feature keys. For more information about how to purchase additional features, contact your Codonics representative.

Easy Imager Personality Swap

The Horizon imager has a "personality"—its configuration and feature information—that is stored on a Smart Card. This allows you to instantly transfer the imager's personality to another imager—say, one being swapped with an existing imager that requires service—minimizing imager downtime. For more information about the Smart Card, refer to Chapter 17.

Easy Software Updates and Configuration Backups

The Horizon imager includes a Zip drive or ports for a USB flash drive to support software updates and backing up imager configuration information. This provides the following benefits:

- Software and firmware releases and updates can be loaded from installation media, making system upgrades easy.
- Imager configuration information can be restored to the imager from backup media, saving you from having to reenter configuration information manually.
- Imager configuration information can be copied to another Horizon imager, saving you from having to configure other imagers manually from scratch.

2

Network Settings

This chapter explains how to configure the imager's network settings if it is going to be part of a complex network.

What Is a Complex Network?

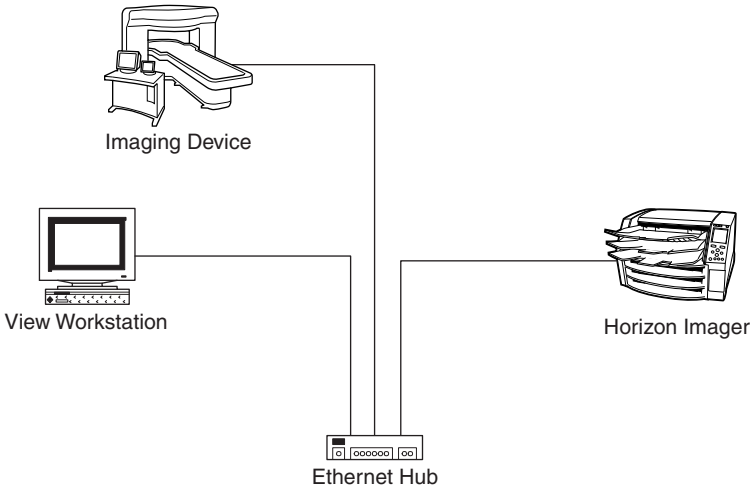
This manual and the *Horizon Imager User's Manual* refers to simple and complex networks, as defined in the next two topics.

Simple Networks

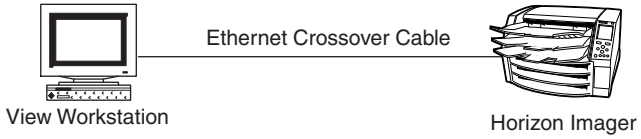
A *simple network* is a local-area network (LAN) that is *not* connected to another LAN or wide-area network (WAN). A WAN would include a connection to the Internet. (Connections to another LAN or a WAN are typically done through a device called a *gateway*.)

A simple network typically comprises several devices connected by Ethernet UTP (unshielded twisted pair) cable through an Ethernet hub. It could also be simpler yet—a workstation or imaging device connected directly to the Horizon imager using an Ethernet crossover cable.

Connecting the Horizon imager to a simple network is covered in the *Horizon Imager User's Manual*.



Simple Network with Ethernet Hub



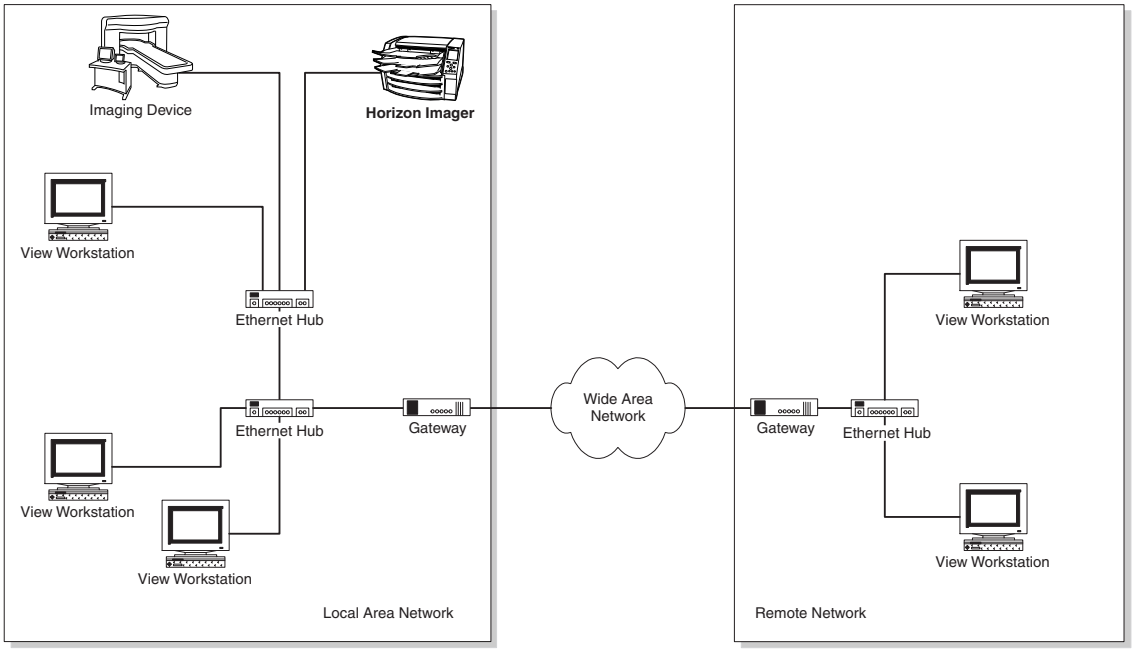
Simple Network with Ethernet Crossover Cable

Complex Networks

A *complex network* is a network with one of the following configurations:

- Multiple LANs, connected by routers or gateways
- One or more LANs connected to remote LANs (that is, a WAN)
- One or more LANs connected to the Internet via an Internet service provider (ISP)

In addition to physically connecting an Ethernet cable to the imager, you have to define an IP (Internet Protocol) address for the imager. This address uniquely identifies the imager on the network.



Complex Network

For complex networks, there are advanced ways of setting up networking schemes behind a firewall [such as NAT (Network Address Translation)]. Consult with your network administrator to see if your network has such a scheme.

Gateways

A *gateway* (sometimes also referred to as a *router*) is a device that interconnects two or more networks and passes data from one to another.

Note that each gateway on a network is treated as a host, and so is assigned its own unique IP address. For the Horizon imager to be able to accept print jobs from other networks, the IP address for its network gateway must be defined in the imager.

For information about how to define the gateway IP address for the Horizon imager, refer to “Specifying the Imager’s IP Addresses” on page 2-10.

IP Addressing Basics

IP Addresses

IP addresses are used to uniquely identify hosts on a TCP/IP network.

IP addresses are 32-bit binary numbers, consisting of four octets. For example:

```
10000000 00001010 00000010 00011110
```

To make these addresses readable for us, they are typically expressed in *dotted decimal notation*. For example, the dotted decimal notation of the binary address shown above is:

```
128.10.2.30
```

The values in each of the four sections of the dotted decimal address can range from 0 to 255, because that is the range of an 8-bit binary number.

Determining What IP Addresses to Use

Determining what IP addresses you can use for devices on your network depends on the following conditions:

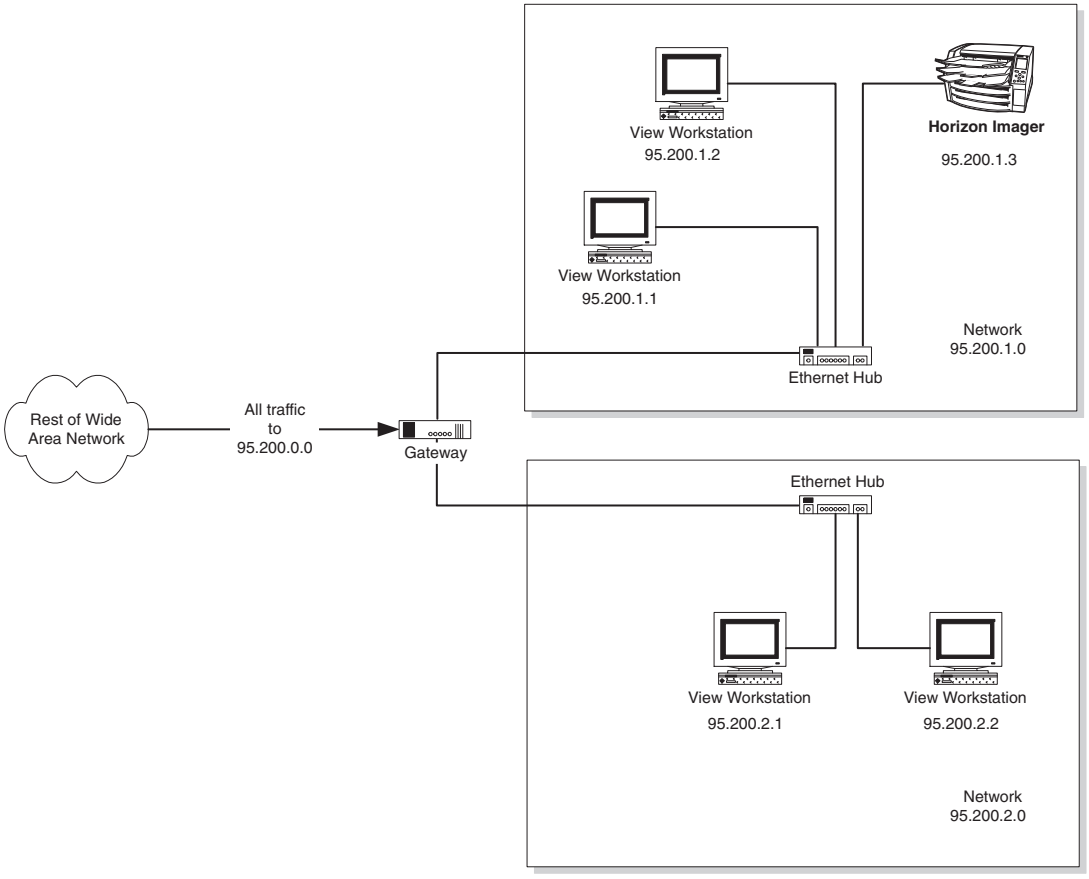
- **Your network is not connected to any other network (for example, another LAN or the Internet).** If this is the case, it does not matter what IP addresses are assigned to the devices, as long as they are unique within your network. If you want to follow the IP standard, the organization that controls assigning IP addresses has designated that the first two numbers of the address be **192.168** (for example, 192.168.1.200) for isolated networks.
- **Your network is connected to the Internet.** In this case, your IP addresses must be unique within the entire Internet. These numbers are assigned to companies and Internet service providers (ISPs). If your network is handled by a network administrator at your organization, you should see the network administrator for the IP address to use for the Horizon imager. If you are handling the network and connecting to the Internet through an ISP, the ISP will provide you with a block of IP addresses to use for the devices on your network.
- **Your network is part of a WAN (that is, there are multiple LANs or subnets).** In this case, unless your network is behind a firewall, your IP addresses must be unique within the entire WAN. If your network is behind a firewall, the IP addresses must still be unique for all devices in the network behind the firewall. These IP addresses are typically assigned by a network administrator at your organization. You should see the network administrator for the IP address to use for the Horizon imager.

Subnetworks and Subnet Masks

Many organizations with multiple LANs assign IP addresses according to those physical networks. In such a configuration:

- A portion of the IP address represents the Internet part (for example, the first two dotted decimal numbers) and the physical network part (for example, the third dotted decimal number). This is referred to as the *subnetwork* or *subnet* portion of the address.
- A portion represents the host (for example, the fourth dotted decimal number).

For example, say an organization has been assigned the IP network address 95.200.0.0. This is the address that hosts on the Internet at large would use. Internally, the organization assigns addresses based on the physical network to which a host is connected. For example, all hosts on one physical network would be assigned addresses in the form 95.200.1.*xxx*, where *xxx* is the unique host ID portion of the address. Hosts on another physical network would be assigned addresses in the form 95.200.2.*xxx*, and so on.



Subnet Addressing

The IP standard specifies that all devices have a *subnet mask* defined. In the subnet mask, the bits that uniquely identify the subnet are set to 1; the bits that correspond to the unique host ID portion are set to 0. Referring to our previous example, the organization's subnet mask would be 255.255.255.0 (11111111.11111111.11111111.00000000 in octet format).

To determine what subnet mask to use for the Horizon imager:

- **If your network is maintained by a network administrator,** see the administrator for the subnet mask used at your site.
- **If you are managing a network that is connected to the Internet through an ISP,** your ISP will provide you with the subnet mask to use.
- **If you are managing an isolated network not connected to any others,** use the Horizon default subnet mask **255.255.255.0**.

For information about how to define the subnet mask for the Horizon imager, refer to "Specifying the Imager's IP Addresses" on page 2-10.

The Horizon Imager and DHCP

Dynamic Host Configuration Protocol (DHCP) is an Internet protocol that allows the dynamic assignment of IP addresses from a DHCP server. DHCP saves a network administrator from having to manually configure an IP address to each host on a network. When a host connects to the network, the DHCP server automatically assigns it an IP address. When the host disconnects from the network (for example, shuts down), the address is returned to the pool of available addresses to be assigned to other hosts. With DHCP, a host will typically get a different IP address each time it connects to the network.

Since it is a printing device, the Horizon imager needs a static, explicit address. This allows remote hosts to know exactly what address to use to send print jobs. For this reason, the Horizon imager does not support the DHCP protocol; its IP address must be manually defined.

Assigning Multiple IP Addresses with IP Aliasing

One effective way to use the Horizon imager's ability to print on multiple media types and sizes is to configure the sending workstation with several "virtual" printers with the Horizon imager's IP address. Each of these virtual printers can then be assigned to use a different Horizon media type and size. Chapter 4 provides detailed explanations of how to do this for DICOM.

Unfortunately, some systems do not allow multiple printers to be defined with the same IP address. To address this limitation, the Horizon imager includes a feature called *IP Aliasing* that allows the imager to have up to five IP addresses assigned to it. This is done by defining a base IP address and then the number of IP addresses you want to assign. The imager will then be assigned a block of IP addresses by incrementing the last octet of the base IP address by one.

For example, if you define a base address of 192.168.1.1 and the total number of IP addresses at 3, then the imager will assign itself the IP addresses 192.168.1.1, 192.168.1.2, and 192.168.1.3.

For more information about how to define a block of IP addresses, refer to "Specifying the Imager's IP Addresses" on page 2-10.

NOTE: *The Horizon imager will not allow a combination of the base address plus the number you want to assign to result in invalid addresses.*

Specifying the Imager's IP Addresses

Refer to the following table for guidelines as to when you need to define a specific IP address, gateway IP address, and subnet mask for the imager.

Network Address Setting	When to Define
Base IP Address (for the imager)	Always. If defining only one IP address for the imager, this will be its address. If defining multiple IP addresses for the imager, this will be the base (first) address in the block of addresses that are assigned.
Gateway	If the imager is going to receive print jobs from remote hosts that are not on the local network. Otherwise, use the default value **0.0.0.0**.
Subnet Mask	If the imager is going to receive print jobs from remote hosts that are not on the local network. Otherwise, use the default value **255.255.255.0**.
Number of IP Addresses	If defining multiple IP addresses for the imager, enter the number of addresses. If defining only one IP address for the imager, use the default value **1**.

To specify the imager's IP address(es), gateway address, and subnet mask

1. At the imager's control panel, press and hold the ◀ key, and while holding it press the MENU key.

   The Main Menu with administrative options displays.

2. Select the following menu options:

   Network Settings
   Addresses

The Network Addresses menu displays:

Network Addresses
Base IP Address: **[0]**.0.0.0 **Gateway:** 0.0.0.0 **Subnet Mask:** 255.255.255.0 **Number of IP Addresses:** 1
Set base IP address **Old value:** 0.0.0.0 UP/DOWN to alter octet, LEFT/RIGHT to change octets
Press MENU to exit menus

Note that bold square *change* brackets are displayed around the first IP address octet value of the base IP address. The bracketed portion of the address is the portion that can currently be changed.

3. Use the ▲ (increment) or ▼ (decrement) key to enter the desired value, then use the ▶ key to move the change brackets to the next address position.

   To move to the change brackets to the next or previous setting, continue pressing the ▶ or ◀ keys.

4. When you are done entering the network addresses, press the ENTER key to save your entries.

   A message states that the imager will automatically reboot when you press the MENU key to exit the Main Menu.

NOTE: *Optionally, to exit the screen without saving your changes, press the* CANCEL *key.*

5. Press the ENTER key to acknowledge the message.

6. When you are finished specifying the network settings and want to exit the Main Menu, press the MENU key.

   The imager reboots.

NOTE: *You can reset the network settings to their default values at any time by selecting the* ***Reset Network Settings*** *in the Network Settings menu.*

Specifying the Network Speed

The Horizon imager supports three network speed/duplex settings:

- **Auto-Sense.** This setting will cause the imager to negotiate for the fastest speed available on the network. The fastest possible speed is 1000 Mbps (megabits per second) at full duplex.
- **10-Base T** and **100-Base T.** These two settings are optimized to match the speed of 10- and 100-Mbps Ethernet networks, running at half-duplex.

To set the network speed, first use the Auto-Sense setting. If this setting does not work (some networks may have problems running at 100 Mbps and/or full duplex), then try using the 100-Base T or 10-Base T setting, as appropriate for your network's actual speed.

To specify the imager's network speed option

1. At the imager's control panel, press and hold the ◀ key, and while holding it press the MENU key.

   The Main Menu with administrative options displays.

2. Select the following menu options:

   Network Settings
   Speed

3. Use the ▲ (increment) or ▼ (decrement) key to select the desired speed option, then press the ENTER key to save your entry.

NOTE: *Optionally, to exit the screen without saving your changes, press the* CANCEL *key.*

A message states that the imager will automatically reboot when you press the MENU key to exit the Main Menu.

4. Press the ENTER key to acknowledge the message.
5. When you are finished specifying the network settings and want to exit the Main Menu, press the MENU key.

   The imager reboots.

NOTE: *You can reset the network settings to their default values at any time by selecting* ***Reset Network Settings*** *in the Network Settings menu.*

IP Addresses for Other Devices

For each device in the network that will be sending print jobs to the Horizon imager, you must:

- Define that device's IP address, gateway IP address, subnet mask, and so on
- Add the Horizon imager's IP address to the list of IP hosts with which the device will communicate

Just how you do this varies, depending on the device and its operating system. For this reason, you will have to refer to the documentation that comes with the device for specific instructions.

3

Imager Preferences

There are several imager preference settings that you can modify:

- Auto-film calibration on/off
- Entry timeout
- Resume timeout
- Speaker volume
- Key beep on/off
- Fault tone on/off
- Key backlight on/off
- Display backlight on/off
- Display contrast

This chapter includes the general procedure for changing these settings.

To change imager preferences

1. At the imager's control panel, press and hold the ◀ key, and while holding it press the MENU key.

   The Main Menu with administrative options displays.

2. From the Main Menu, select the **Preferences** option.

   The Preferences menu lists the preference settings currently stored on the imager.

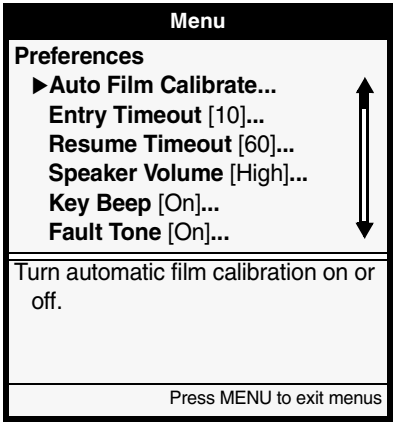


   Table 3-1 on page 3-3 describes all of the imager preference settings.

3. To change a preference setting, select it and then enter or choose the appropriate value.

4. To save that change, press the ENTER key.

   You are prompted to confirm the save.

5. Press the ENTER key to confirm the save, or the CANCEL key to cancel it.

To reset the imager preferences to the factory defaults

1. From the Preferences menu, select the **Reset Preferences** option.

   You are prompted to confirm the reset.

2. Press the ENTER key.

All Preferences settings are changed back to the factory defaults.

Table 3-1. Imager Preference Settings

Preference	Description
Auto Film Calibrate	When on, calibrates the imager for each new **DirectVista** grayscale film cassette. When off, uses a default calibration stored in the imager.
Entry Timeout	When the Main Menu is displayed on the control panel, the number of seconds the imager waits for a user to key an entry before automatically returning to the Status screen and turning off the key backlighting. The range is 1 to 15 minutes.
Resume Timeout	If the imager was paused using the control panel PAUSE key but is able to resume, a prompt to resume printing will display after this configurable timeout period. After another minute, with no user intervention, the imager will automatically resume printing. The range is 60 to 300 seconds, or disabled. If the imager is coming out of being paused due to a fault state, it will automatically resume normal operation without operator intervention after a few seconds (that is, this Resume Timeout will be ignored).
Speaker Volume	Sets the imager's speaker volume. Possible values are: • Off • Low • High
Key Beep	When on, sounds a beep anytime a user presses a key. When off, pressing a key does not sound a beep.
Fault Tone	When on, sounds a tone when the imager requires operator intervention. When sounding, you can stop the tone by pressing any control panel key. When off, the fault tone will not sound when the imager requires operator intervention.

Table 3-1. Imager Preference Settings (cont.)

Preference	Description
Key Backlight	When on, lights the keys on the control panel. When off, the keys will not light. ***NOTE:*** *You may want to turn key backlighting off if using the imager in a dark room.*
Display Backlight	When on, lights the control panel display. When off, the control panel display will not light.
Display Contrast	Adjusts the control panel display contrast, allowing you to optimize the display readability (which can be affected by lighting conditions, viewing angle, and temperature).
Reset Preferences	Changes the preferences back to the factory-default settings.

4

Configuring DICOM Printing

To support sending print jobs from DICOM applications, you must:

- Configure the Horizon imager's DICOM information in the DICOM user application. The Horizon imager configuration information is provided in the next topic.
- Determine the method for allowing users to select the features supported by the Horizon imager. For more information, refer to "Methods for Selecting Media" on page 4-3.

NOTE: *If you are running DICOM Lite on the imager and see connection errors at the console or workstation from which you are sending print jobs, you may require more connections than DICOM Lite provides. Contact Codonics technical support (for contact information, refer to page xx in the Preface) for assistance.*

Configuring DICOM Information

To properly configure a DICOM application to support printing to the Horizon imager, you need its TCP port number and the Called AE Titles that can be used to identify the imager:

- The imager's TCP port number is **104**.
- The Called AE Titles are listed in Table 4-1 on page 4-2, which also describes how they are used.

Table 4-1. Called AE Titles Supported by the Horizon Imager

Called AE Title	Description
Print_SCP	This is the default DICOM Called AE Title for the imager. With this Called AE Title used, if the media type or size is not included in the DICOM print job fields, the imager detects the image type and selects the media type and size as follows: • For grayscale images, uses the media defined for Grayscale in the Default Media menu at the control panel. • For color images, uses the media defined for Color in the Default Media menu at the control panel. The media defined for each of these could be grayscale or color. For more information on defining the default media for grayscale and color images, refer to the *Horizon Imager User's Manual.*
DefaultGrayscale	Causes the imager to use the media type and size defined for Grayscale in the Default Media menu at the control panel. This could actually be grayscale or color media.
DefaultColor	Causes the imager to use the media type and size defined for Color in the Default Media menu at the control panel. This could actually be grayscale or color media.
The name of a system or custom Job Settings file	For printing with Job Settings files, in which the media type and size can be specified, among other print parameters. For more information about Job Settings files, refer to Chapter 8. For a complete listing of the system Job Settings files that come preloaded in the imager, refer to Appendix B.
SpecialBracket	For printing bracketing sheets. For more information, refer to Chapter 14.
SpecialSlide	For printing 35mm slides. For more information, refer to "Using the 35mm SlideMaker Format" on page 9-34.

NOTE: *Called AE Titles are case-insensitive.*

Methods for Selecting Media

The Horizon imager supports features and settings that may not be implemented in existing DICOM user applications. An example of this is the wide variety of media type and size combinations supported by the Horizon imager. In this topic, we examine some of the possible implementations for selecting media type and size, and present solutions for working within potential DICOM application limitations.

For more information about the Horizon print parameters and how they map to DICOM attributes, refer to “Horizon–DICOM Print Information” on page 4-7.

The Horizon imager can receive print parameter values from a variety of sources, including the DICOM attributes sent with the print job, Horizon Job Settings files, and the Default Media and Default User Settings menus at the control panel. To fully understand how to implement Horizon printing solutions, you need to understand how the imager determines which parameters to use if they are coming from multiple sources. For more information about this topic, refer to “Parameter Selection Process” on page 6-28.

Application Allows Media Selection of Supported Horizon Types and Sizes

If the DICOM application already supports selecting media types and sizes (say, from drop-down lists), and they include the types and sizes supported by the Horizon imager, no alternate implementations are needed. Users would simply select the desired Horizon media type and size from within the application.

If the DICOM application allows you to define multiple printers, all pointing to the Horizon imager, you could also:

- **Create a printer for each combination of media type/size supported by your Horizon imager, and set the defaults for each printer accordingly.** For example, let's say your imager supports 14 x 17-in. blue film and 8 x 10-in. clear film. You could create two printers, name them "Horizon Blue Film 14x17" and Horizon Clear Film 8x10," and set their media type and size accordingly. Users would then know which printer to use for both available media.
- **Create a printer for each media type, but let users select the size.** For example, let's say your imager supports all sizes of blue and clear film. You could create two printers, name them "Horizon Blue" and "Horizon Clear," and set their default media types accordingly. Users would then know which printer to use for a given media type, but select the appropriate size themselves.

If you are defining multiple printers that point to the Horizon imager, you would have to configure the following parameters for each printer:

- The Horizon imager's IP address
- The Horizon imager's TCP port number—**104**
- The Called AE Title (for the Horizon imager, the default Called AE Title is **Print_SCP**)

If the application or operating system does not allow you to define multiple printers with the same IP address, you could use the Horizon imager's IP Aliasing feature. This feature allows you to assign multiple IP addresses for the same imager. For more information, refer to "Assigning Multiple IP Addresses with IP Aliasing" on page 2-9.

Media Selection Supported, but Not Horizon Types or Sizes

It is possible that the DICOM application allows users to choose a media type and size, but one or more types or sizes supported by the Horizon imager are not in the list of choices. The solution you use to overcome this limitation depends on the type of user you are:

- **If you are a developer [**for example, for a value-added reseller (VAR) or system integrator], you may be able to modify the application's properties or configuration file to add the Horizon types and sizes to the list of choices. If this is not possible, you would have to use one of the solutions suggested in the following alternate solutions topics.
- **If you are a site administrator or other type of power user** who is responsible for supporting use of the imager, you would have to use one of the solutions suggested in the following alternate solutions topics.

Brief Overview of Job Settings Files

Job Settings files are sets of job, sheet, and image parameters—including the media type and size—that are stored in the imager and can be applied to a print job. With DICOM, a Job Settings file can be specified using the name of the Job Settings file as the Called AE Title. For a complete explanation of Job Settings files, refer to Chapter 8.

Each imager is preloaded with system Job Settings files that define each of the available Horizon media type/size combinations (but no other job, sheet, or image parameters). A list of these system Job Settings files is included in Appendix B. Note that the media-specific type/size combinations supported by an imager depend on the media options purchased for that imager.

Using Job Settings Files to Specify Media Type and Size

Following are some alternative solutions for using Job Settings files to set the media type and size **if the DICOM application allows you to define multiple printers pointing to the same Horizon imager**:

- You could create a printer for each of the media type/size combinations supported by your Horizon imager, and use the corresponding system Job Settings file name as the Called AE Title. When the imager receives a DICOM print job, it will use the media type and size specified in the Job Settings file whose name matches the Called AE Title. For example, if you wanted to support printing to 14 x 17-in. **DirectVista** paper/white film, you would create a printer that used the Job Settings file name **14x17-dvp** as its Called AE Title.
- There are two special system Job Settings files called **defaultgrayscale** and **defaultcolor**. These Job Settings files cause the imager to use the media type and size defined for grayscale and color in the Default Media menu at the control panel. So, for grayscale images, you could create a printer in the DICOM application with the Called AE Title **defaultgrayscale**, then set the media type and size you want to use for grayscale images in the Default Media menu. When the imager receives a DICOM print job with the Called AE Title **defaultgrayscale**, it will use the media type and size specified for grayscale in the Default Media menu.

If the DICOM application allows you to define only one printer that points to the Horizon imager, possible media selection solutions include the following:

- You could create a custom Job Settings file at the control panel called **Print_SCP** (the default Called AE Title for the Horizon imager), and set the desired media type and size in the Job Settings file. However, that would be the only type and size that could be used, since the Job Settings file overrides all other ways of defining print job parameters, including the media type and size settings selected in the Default Media menu.
- You could keep changing the printer's Called AE Title to match the Job Settings file that defines the media type and size you want to use for each print job.

Using the Default Media Menu to Specify Media Type and Size

As an alternative to using Job Settings files, you could use the Default Media menu at the control panel to select the media type and size. The Default Media menu allows you to specify the default media type and size to use for grayscale images, and the default to use for color images.

The limitation to this approach is that all grayscale images will be printed on the same media type and size, and all color images on the same type and size, unless and until they are manually changed using the Default Media menu at the control panel.

Horizon–DICOM Print Information

For complete information about how DICOM is implemented on the Horizon imager, refer to the Horizon Conformance Statement. The conformance statement is available on the Codonics web site (**www.codonics.com**).

Horizon–DICOM Print Parameter Mapping

As a reference, Table 4-2 lists the supported Horizon print parameters and to which DICOM attributes they map.

Table 4-2. Mapping of Horizon Job Settings Parameters to DICOM Attributes

Horizon Print Parameter	DICOM Attribute (Tag)
Media Type	MEDIUM TYPE (2000,0030)
Media Size	FILM SIZE ID (2010,0050)
Receive Tray	FILM DESTINATION (2000,0040)
Priority	PRINT PRIORITY (2000,0020)
Gamma	CONFIG. INFORMATION (2010,0150) - GAMMA
Contrast	CONFIG. INFORMATION (2010,0150) - CONTRAST
Dmax	MAX DENSITY (2010,0130)
LUT	CONFIG. INFORMATION (2010,0150) - LUT
Polarity	POLARITY (2020,0020)
Saturation (TCR can also be used: TCR values 0 to 100 map to saturation values 0 to –100)	CONFIG. INFORMATION (2010,0150) – SATURATION
MCM	CONFIG. INFORMATION (2010,0150) - MCM
Background	BORDER DENSITY (2010,0100)
Scaling	MAGNIFICATION TYPE (2010,0060)
Rotate	None
Antialias	None
Image Warnings	None
Captions	None
Border Fill	None
Coverage	None
Nudge	None

Printable Area of Sheets

As a reference, Table 4-3 lists the printable areas for each of the Horizon media type/size combinations.

Table 4-3. Printable Area per Horizon Media Type and Size

Media Type	Media Size	Printable Area—Columns x Rows by Pixels [0.0031 in. (79.5 microns)]
DirectVista Paper/White Film	8 x 10 in. (203 x 254 mm)	2406 x 2790
	A (8.5 x 11 in.)	2580 x 3164
	A4 (210 x 297 mm)	2514 x 3374
	11 x 14 in. (279 x 356 mm)	3376 x 4072
	14 x 17 in. (356 x 432 mm)	4322 x 5025
	14 x 36 in. (356 x 914 mm)	4322 x 11095
	14 x 51 in. (356 x 1295 mm)	4322 x 15885
DirectVista Film	8 x 10 in.	2406 x 2790
	11 x 14 in.	3376 x 4072
	14 x 17 in.	4322 x 5025
ChromaVista Paper/White Film	8 x 10 in.	Not yet defined
	A	2580 x 3400
	A4	2514 x 3620

5

Configuring PostScript Printing

PostScript Printing—Windows

The Horizon imager supports PostScript print jobs from any Windows workstation running Windows 98, Me, NT 4.0, 2000, or XP. The tasks required to support PostScript printing to the imager are:

- **Installing the Horizon imager PostScript driver and PPD file onto the workstation.** Instructions for downloading and installing the Horizon PostScript driver for various versions of Windows 98 or newer are described in Technical Briefs. The Technical Briefs are available on the PostScript Driver CD-ROM shipped with the imager and on the Codonics web site (**www.codonics.com**).
- **Adding the Horizon imager as a Windows desktop printer.** This is done using the standard Windows "Add a Printer" wizard, or by a "Point and Print" connection as a network printer. When adding the imager as a desktop printer, you will need to select the Horizon imager's PostScript driver and PPD file. For information about adding the Horizon imager as a desktop printer, refer to the appropriate Horizon PostScript Technical Brief.

Once the imager has been added as a desktop printer, users can print to it from any application using the standard Windows Print function. For more information about sending PostScript print jobs and setting Horizon PostScript parameters (such as media type and size), refer to the *Horizon Imager User's Manual*.

Applications That Generate Non-Standard PostScript

The Horizon imager uses Microsoft Windows print drivers that generate PostScript commands to transfer page layout information to the imager. These print drivers are primarily intended for use with application programs that utilize standard Graphics Device Interface (GDI) print driver interface calls to construct pages of graphics and text for output to the imager.

When used with applications that conform to the standard GDI methods of constructing a page, the advanced configuration settings of the Horizon print drivers will control the media selection and image processing capabilities of the imager. The advanced configuration settings are communicated to the imager as DSC (Document Structuring Conventions) comments embedded in the PostScript job stream. These comments are unique to Horizon and will not work on other imagers. The DSC comments are recognized by the PostScript-compatible interpreter in the Horizon imager and set the appropriate media and image processing settings to use for that print job.

Some applications bypass the traditional GDI methods of constructing pages. Although rare, these applications generate their own PostScript commands, ignoring the usual print driver mechanisms. The custom PostScript job stream is sent directly to the imager using a special GDI print driver call. Applications using this technique usually create print jobs that omit the PostScript DSC comments used by Horizon to control media selection and image processing. When a Horizon imager receives such a job, the imager will not know which media to use or how to render the image on that media. The most common problem when DSC comments are missing from the PostScript job stream is printing on the wrong media or rendering the image at the wrong size for the media.

The best way to determine if the DSC comments are missing is to print to a file from the application in question using the Horizon print driver. After the file is saved, open it with a text editor and look for a DSC comment in the first 500 lines of the file. Sample DSC comments are shown in the following example:

```
featurebegin{
%%BeginFeature: *CXMediaType CVPaper
%CDXFeature: *CXMediaType CVPaper
%%EndFeature
}featurecleanup

featurebegin{
%%BeginFeature: *CXMediaSize A
%CDXFeature: *CXMediaSize A
%%EndFeature
}featurecleanup
```

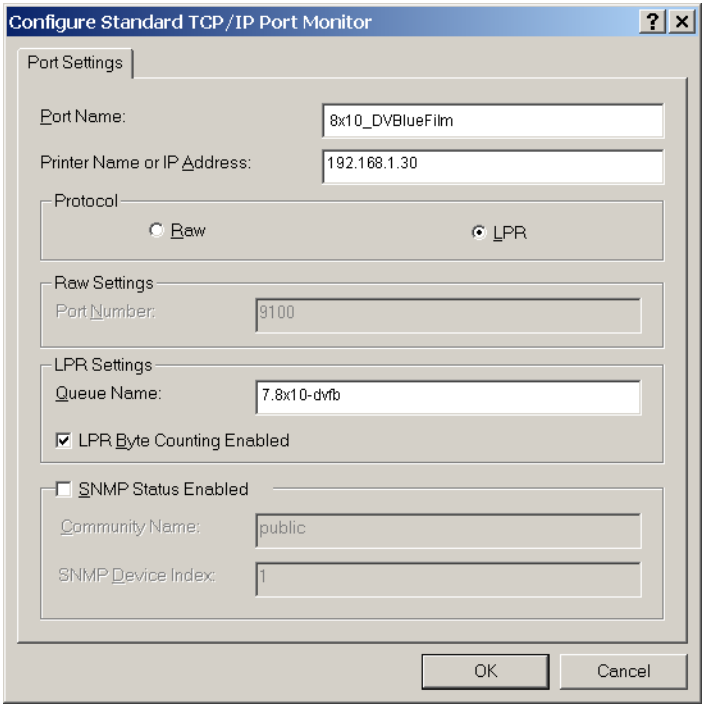
All DSC comments describing Horizon advanced configuration features begin with the letters “CX.” As shown in the previous example, the entries CXMediaType and CXMediaSize would be present if the application program used the Horizon print driver in the usual manner. If these entries are not in the file, then the application is probably using the print driver in a non-standard way. It is important to make sure that non-standard applications are generating proper PostScript output. It is outside of the scope of this document to describe the PostScript language; however most PostScript files are human-readable and have the string “%!PS” at the beginning of one of the first lines of the file.

Solution for Processing Non-Standard PostScript File

The workaround for this problem is to add Horizon Job Setting file information to the LPR port on any Windows system that sends print jobs to Horizon. The LPR port transfers PostScript print jobs from the Windows operating system to Horizon logical device 7 on the Horizon imager. (For more information on logical devices, refer to "Horizon Logical Devices That Support PostScript Jobs" on page 5-12.) Appending a Job Settings file name to logical device 7 will force the imager to use the print parameters set in the Job Settings file. The parameters set in a Job Settings file provide the same functionality as the missing DSC comments in the PostScript print job. Parameters set in a Job Settings file take precedence over parameters set in PostScript DSC comments.

The easiest way to select a specific media type or size is to use one of the system Job Settings files that come preloaded with the Horizon imager. These files define all of the media type/size combinations supported by the Horizon imager (and only those parameters). Alternately, you can create custom Job Settings files that include other print parameters. For more information about Job Settings files, refer to Chapter 8. A complete list of the system Job Settings files is provided in Appendix B.

Once you have chosen a suitable Job Settings file, you need to run the Windows Add a Printer wizard to create a new desktop printer that points to the Horizon imager. When the wizard displays the Port Settings, enter the number **7** (specifying Horizon logical device 7), followed by a period and the name of the Job Settings file in the **LPR Queue** field. For example, entering **7.8x10-dvfb** as the LPR queue name will force a PostScript job sent to this desktop printer (that is, the Horizon imager) to print on 8 x 10 **DirectVista** blue film. The sample screen that follows shows the Port Settings tab in the Add a Printer wizard for Windows 2000.



If more than one media type/size combination is required, then you will have to create a separate desktop printer that points to the Horizon imager for each combination, defining the Job Settings file to use in the LPR Queue field as described in the previous paragraph.

A final step is to make sure the Advanced Configuration Settings of the print driver are assigned to match the parameters set in the Job Settings file you are specifying. This will ensure that application programs that properly use the print drivers will work the same as non-standard applications that rely on the Job Settings file. As stated previously, parameters set in a Job Settings file take precedence over parameters set in PostScript DSC comments. Since most applications are well-behaved and will generate the appropriate DSC comments, it is important to have the media type and size consistently set for all applications. Refer to the Technical Brief for the Horizon Windows PostScript driver that you are using for information on how to set the default properties of the print driver.

It is also recommended that the Windows desktop printers be given names that indicate what they will do. For example, the printer that will always print on 8 x 10 **DirectVista** blue film would have a name such as "8x10 Grayscale Blue Film." For users, this will simplify selecting the correct desktop printer to print to the desired Horizon media.

PostScript Printing—Macintosh

The Horizon imager supports PostScript print jobs from any Macintosh running OS 8, OS 9, or OS X. The tasks required to support PostScript printing to the imager are:

- **Installing or upgrading the Apple LaserWriter PostScript driver (OS 8 and OS 9 only).** The compatible version of the LaserWriter driver is included on the Horizon PostScript Drivers CD-ROM shipped with the imager.
- **Installing the Horizon PPD file.** Instructions for how to install the PPD file are included in the *Horizon Macintosh Drive Installation* Technical Briefs.
- **Adding the Horizon imager as a Macintosh printer.** This is done using the standard Macintosh method—via Chooser in OS 8 and OS 9, and the Printer Setup Utility in OS X.

Complete instructions for installing the necessary files and adding the imager as a Macintosh printer are included in the *Horizon Macintosh Drive Installation* Technical Briefs, PDF versions of which are included on the driver CD-ROM and on the Codonics web site (**www.codonics.com**).

Once the imager has been added as a desktop printer, users can print to it from any application using the standard Macintosh Print function. For more information about sending PostScript print jobs and setting Horizon PostScript parameters (such as media type and size), refer to the *Horizon Imager User's Manual*.

PostScript Printing—UNIX

PostScript Printing from UNIX

UNIX users can send PostScript print jobs to the Horizon imager in the following ways:

- **Sending the PostScript file using FTP.** With this method, users specify one of the three Horizon logical devices that support PostScript files as part of the password when logging in to a Horizon FTP session. For more information about the logical devices, refer to "Horizon Logical Devices That Support PostScript Jobs" on page 5-12.
- **Printing the PostScript file using LPR.** The UNIX user would pick the Horizon LPR printer that matches the set of Horizon parameters to use for the print job. This method requires that you create LPR printers that specify one of three Horizon logical devices that support PostScript files in the LPR printer definition.

Both of these methods require that you perform setup tasks so that users can access Horizon imager parameters that are not included in the generic set of PostScript parameters, including Horizon media types and sizes. The available methods are discussed in "Methods for Selecting Horizon Media Type and Size" on page 5-9. Additional topics related to implementing PostScript printing are included in other chapters in this manual:

- Because Horizon parameters can be set in a variety of places (Job Settings files, the PostScript file, at the control panel, and so on), there is a hierarchy that the imager uses to determine which source takes precedence over the others. The parameter source hierarchy is described in "Parameter Selection Process" on page 6-28.
- Horizon logical devices are explained in Chapter 9.

- Printing files using FTP is covered in Chapter 10.
- Printing files using LPR is covered in Chapter 11.

Methods for Selecting Horizon Media Type and Size

The Horizon imager supports print parameters that are not included in typical PostScript parameter sets. An example of this is the wide variety of media type and size combinations supported by the Horizon imager.

When setting up the imager to support UNIX users, you will need to determine how you want to allow those users to select Horizon-specific print parameters such as media type and size, which in turn determines how to implement the support for these parameters.

Table 5-1 on page 5-10 describes the approaches you can take to select the various Horizon media types and sizes. Selecting other Horizon print parameters can be done using similar approaches.

Note that the suggested PostScript solutions described in this chapter make a distinction as for which type of user of this Technical Manual the solution is appropriate:

- **A site administrator or other type of power user** who is responsible for supporting use of the imager
- **A developer** [for example, for a value-added reseller (VAR) or system integrator] who is responsible for setting up the imager for use by a customer

Table 5-1. Methods for Selecting Media Type and Size with UNIX PostScript

Method	Description	Pros and Cons
Using System Job Settings Files (power user and developer)	Horizon system Job Settings files allow you to specify each combination of Horizon media type and size. The appropriate system Job Settings file can then be specified during an FTP session or in the definition of an LPR printer to select the desired media. For more information about Job Settings files, refer to Chapter 8. A complete list of the system Job Settings files is provided in Appendix B. This is the Codonics-recommended solution, unless you can implement the Horizon DSC comments solution discussed in the last row of this table.	**Pros:** Provides most control and flexibility in selecting Horizon media. **Cons:** Have to specify Job Settings file for each combination of Horizon media type/size to be used.
Use the Default Media menu settings for Grayscale (power user and developer)	If a system Job Settings file is not specified, the Horizon imager assumes that the PostScript file is a grayscale image. The imager then uses the media type and size defined for Grayscale in the Default Media menu at the imager control panel. Instructions for using the Default Media menu is provided in the *Horizon Imager User's Manual*.	**Pros:** Parameters can be easily set at the control panel. **Cons:** Have to manually change the media type and size for Grayscale in the Default Media menu if they do not match the media required for the print job about to be sent. Other users could get unexpected results for their print jobs.
Adding Horizon DSC Comments to the PostScript File (developer only)	You can specify Horizon media types and sizes, which are not covered by standard PostScript, by having your application set the parameters in DSC comments included in the PostScript file. The imager will then interpret the Horizon DSC comments to determine the media to use. (In addition to media type and size, there are other Horizon print parameters that are not supported in standard PostScript but which can be added by using Horizon DSC comments. Refer to Table 5-6 on page 5-21 for a complete listing of the special Horizon parameter DSC comments.) PostScript files that contain Horizon DSC comments must be sent to Horizon logical device 7. For more information about the Horizon logical devices that can process PostScript files, refer to "Horizon Logical Devices That Support PostScript Jobs" on page 5-12.	**Pros:** Ability to set Horizon parameters within the PostScript file, instead of defining Job Settings files or changing the Grayscale settings in the Default Media menu for each print job. **Cons:** Source application that generates the PostScript file must be modified to include the Horizon DSC comments, or comments must be added manually.

Sample Implementation

As an example of a media selection implementation using PostScript, let's say you want to allow users to print the following:

- Grayscale images on 14 x 17 **DirectVista** grayscale blue film and A-size **DirectVista** grayscale paper/white film.
- Color images on A-size **ChromaVista** color paper/white film.

Table 5-2 explains how supporting these choices might be implemented.

Table 5-2. Methods for Selecting Horizon Media Using PostScript

Method	Description
Use Horizon system Job Settings files (power user and developer)	Use the three system Job Settings files that correspond to the three media types/sizes to be supported. • Explain to users who want to send print jobs via FTP which system Job Settings file name to specify during the FTP session for each of the three media type/size combinations. • For LPR printing, specify each system Job Settings file in three different LPR printer definitions. Explain to users which LPR printer to use for each of the three media type/size combinations.
Use the Default Media menu settings for Grayscale (power user and developer)	Prior to each print job, users will have to use the Default Media menu at the imager control panel to change the Grayscale media to the desired media type/size.
Add Horizon parameter DSC comments to the PostScript file (power user only)	If users are using a custom application to generate the PostScript file, you will have to modify the application to allow users to select between the three media type/size combinations, then include the corresponding Horizon DSC comments in the output PostScript file. Another option is to manually edit each PostScript file to include DSC comments for the desired media type and size.

General PostScript Information

Horizon Logical Devices That Support PostScript Jobs

Generally, the Horizon imager is compatible with any PostScript file that conforms to PostScript level 1, 2, or 3, and is tolerant enough to process many jobs that do not completely conform.

When sending images to the Horizon imager using FTP or LPR, the imager uses numbers—referred to as *logical devices*—to determine how to process the print job (for more information about Horizon logical devices, refer to Chapter 9).

There are three Horizon logical devices that support PostScript jobs sent using FTP or LPR printing, as explained in the following two topics.

Logical Devices 1 and 2

The imager will process a PostScript file submitted to logical device 1 or 2 as a PostScript job as long as there is a line that begins with the percent (%) character within the first 512 bytes of the file.

- **PostScript files submitted to logical device 1** are rendered as defined in the PostScript file with no additional scaling.
- **PostScript files submitted to logical device 2** are rendered as defined in the PostScript file, then scaled up or down by the imager to the full printable area of the selected media.

NOTE: *Logical devices 1 and 2 do not support processing PostScript files that include Horizon DSC comments. They must be submitted to logical device 7.*

Logical Device 7

Logical device 7 is reserved for processing PostScript files only. Because it processes all submitted jobs as PostScript, it is the most tolerant of the three logical devices in terms of conformance to PostScript specifications. Marginally compliant or noncompliant jobs that fail using logical devices 1 and 2 might print successfully using logical device 7. Logical device 7 is also the only logical device that can process PostScript files that include Horizon DSC comments.

PostScript files submitted to logical device 7 are rendered as defined in the PostScript file with no additional scaling.

Unlike logical devices 1 and 2, logical device 7 will print only the marked area of the image. That is, any area outside the image is cropped and will be printed using the specified background color. For more information about this topic, refer to “Image Cropping with PostScript Jobs” on page 5-14.

Image Cropping with PostScript Jobs

PostScript jobs generally define a white page that is the size of the printable area of the media, then place text, graphics, or bit-mapped images in the printable area.

When processing a PostScript file sent to Horizon logical device 1 or 2, the Horizon imager will crop the image data to the smallest rectangle that still includes all marked pixels in the image (marked pixels include white pixels, which will appear as no pixels). Unless a background color has been specified, the margin between the image area and the boundary of the printable area will print white.This can be a problem if the image should be printed on a black background, which is typically the case with film. The white margin will print between the image and the black background, as shown in Figure 5-1.

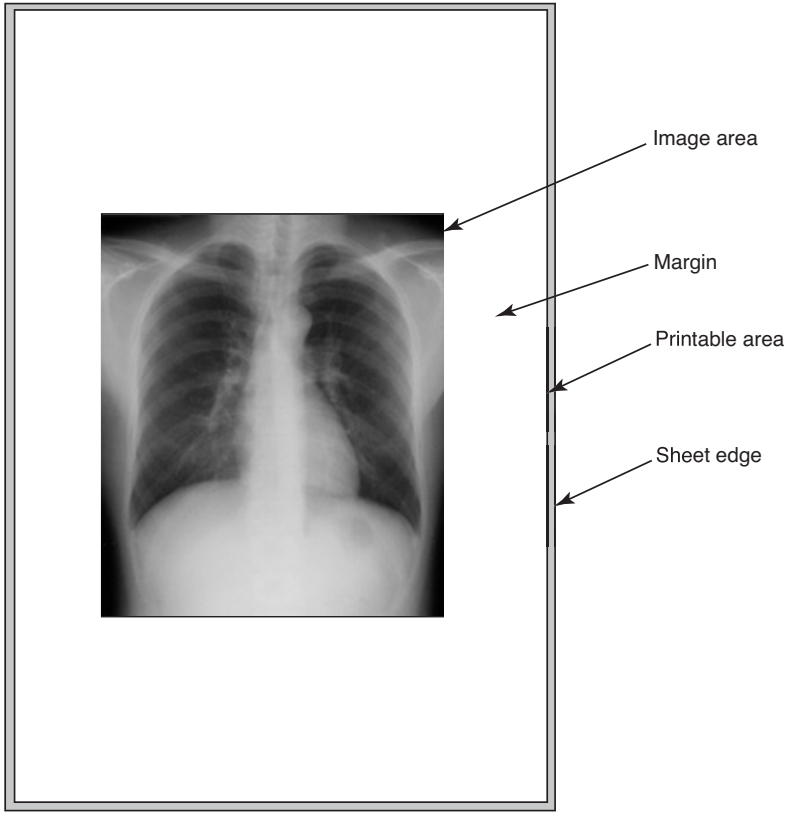


Figure 5-1. White Margins Around Image Area

To eliminate the white margins, use logical device 7. Unlike logical devices 1 and 2, which will print the white margins, logical device 7 uses an automatic margin cropping feature that removes any white margins outside the region of marked pixels.

In addition to using logical device 7, developers could use the Horizon DSC comment **CXCropMargin** entry, which has the values **True** or **False**.

NOTE: *Horizon DSC comments in a PostScript file take precedence over corresponding print parameters defined in any other possible source except for Job Settings files. So, while printing to logical device 7 implies that the Crop Margin parameter is set to True, a CXCropMargin DSC entry in the PostScript file will take precedence.*

Correct PostScript Page Size and Maximum Printable Areas for Horizon Media

To properly use the entire printable area on Horizon media, the PostScript file should use the correct Horizon page size and maximum printable area size measurements.

The correct page sizes are listed in Table 5-3. The largest printable areas are specified in Table 5-4 on page 5-17. The printable area offsets are illustrated in Figure 5-2 on page 5-18.

For an example of how to specify a Horizon media page size in a PostScript file, refer to the first few lines of code in the "Sample Horizon DSC Comments in a PostScript File" on page 5-25.

Table 5-3. Horizon Page Sizes

Page Size	Size in Points (1/72 in.)
8 x 10	569 x 708
A	612 x 792
A4	595 x 842
11 x 14	790 x 997
14 x 17	1008 x 1224

Table 5-4. Horizon Printable Area Sizes

Page Size	Offsets [in Points (1/72 in.)] from Bottom Left Corner of Sheet to Printable Area			
	X Offset to Bottom Left Corner	Y Offset to Bottom Left Corner	X Offset to Top Right Corner	Y Offset to Top Right Corner
8 x 10	14	18	555.35	645.75
A—**DirectVista** paper/white film	16	18	596.5	729.9
A—**ChromaVista** paper/white film	16	18	596.5	783
A4—**DirectVista** paper/white film	15	18	580.65	777.15
A4—**ChromaVista** paper/white film	15	18	580.65	832.5
11 x 14	15	18	774.6	934.2
14 x 17	18	18	990.45	1148.62

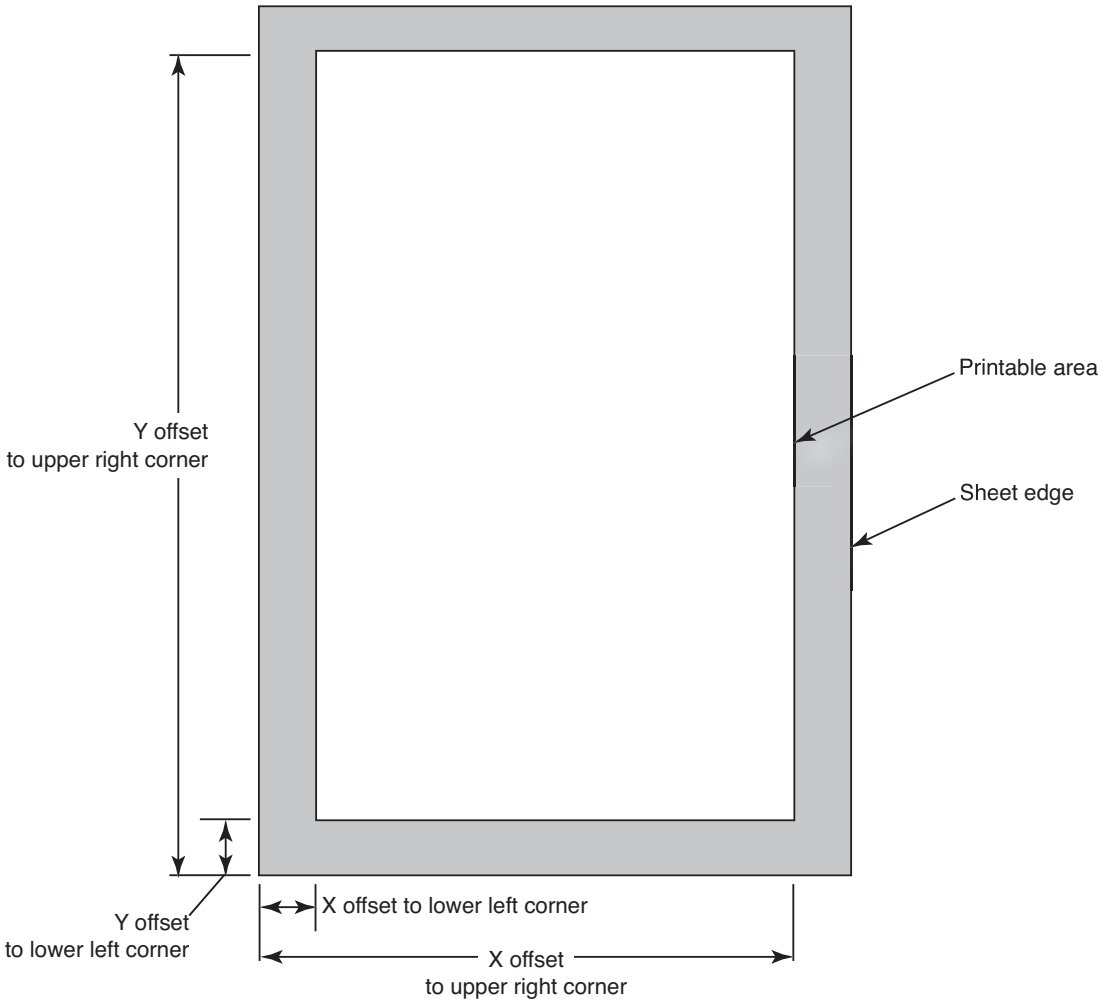


Figure 5-2. PostScript Printable Area Offsets

Horizon Print Parameters in DSC Comments

The information in this topic is provided if you want to implement support for Horizon print job parameters that are not standard PostScript and need to be implemented as DSC (Document Structuring Conventions) comments.

NOTE: *PostScript files that contain Horizon DSC comments must be sent to Horizon logical device 7.*

NOTE: *Horizon DSC comments in a PostScript file take precedence over corresponding print parameters set in any other possible source except for Job Settings files.*

Table 5-5 on page 5-20 lists the Horizon print parameters that can be set only in DSC comments in a PostScript file.

Table 5-6 on page 5-21 lists the Horizon print parameters that can be set in DSC comments, but can also be set by other means (for example, Job Settings files).

For a complete description of the Horizon parameters, refer to Chapter 6. To see a sample use of the Horizon DSC comments in an actual PostScript file, refer to "Sample Horizon DSC Comments in a PostScript File" on page 5-25.

Note that the sheet orientation, the number of copies to print, and the layout of images on the sheet are handled using standard PostScript commands (not DSC comments).

Table 5-5. Horizon Print Parameters That Can Be Set Only as PostScript DSC Comments

Settings	Allowed Values	Description
CXAntialias	None, Better, Best	None—no antialiasing is performed. Better—a compromise between antialiasing quality and print speed. Best—highest antialiasing quality, but requires the most processing time.
CXCropMargin	True, False	If True, eliminates white margin around the image area if image is smaller than printable area.
CXLogicalDevice	Unscaled Scaled GCTBracket MCMBracket	The Unscaled value causes the image to print at actual size. If the image is larger than the printable area, it will be cropped. This is the default setting, used if no CXLogical Device comment is included. The Scaled value causes the image to be scaled to the largest possible size within the printable area. The GCTBracket and MCMBracket choices cause the image to be printed on a bracketing sheet. For more information about bracketing sheets, refer to Chapter 14.
CXMarginSize	0 to 50 (pixels)	Works with Crop Margin to create small border around region of interest.
CXPrintFMF	True, False	Used with Fixed Multiformatting (FMF) sheets to force print if sheet is not completely filled.
CXSkipBlankPages	True, False	Prevents printing of a sheet or cell if blank.

Table 5-6. Horizon Print Parameters as PostScript DSC Comments That Can Be Set Elsewhere

Settings	Allowed Values	Description
Job Settings		
OutputBin	Upper, Middle, Lower	Specifies which receive tray to use. (Does not include the "CX" prefix because it is a standard PostScript parameter, compatible with the Horizon imager.)
Sheet Settings		
CXBackground	White/Clear, Light, Medium, Dark, Black	Sets color of any part of sheet or cell not covered by an image.
CXBorderFill	True, False	Determines whether the border color extends to the media edges (beyond printable area), or not. For **DirectVista** film, the filled border area stops just a few millimeters from the edges. For **ChromaVista** paper/white film, it extends to slightly beyond the edges to ensure fill coverage to the edges. The CXBorderFill as no effect on **DirectVista** paper/white film.
CXCaptions	True, False	Enables or disables captions if any have been set up. Note that captions cannot be set up via PostScript.
CXDecimateWarn	True, False	Enables or disables the inclusion of an image decimation warning being printed on the sheet if the printed image has been decimated.
CXDmax	100 to 400	Maximum image density value.
CXDmin	0 to 100	Minimum image density value.
CXFilmView	Front, Back	The direction from which the film is viewed once printed.
CXLutType	VISUAL or LINEAR or Custom1 through Custom8	Look-up table. Customized data curves that affect an image's appearance.
CXSheetCoverage	STANDARD FULLBLEED NP	Determines whether there will be a border between images and edges of the sheet (STANDARD), or images will bleed off the sheet edges (FULLBLEED). When set to NP, causes the imager to emulate a print resolution of 300 dpi for NP series imager legacy support.

Table 5-6. Horizon Print Parameters as PostScript DSC Comments That Can Be Set Elsewhere (cont.)

Settings	Allowed Values	Description
Image Settings		
CXContrast	-100 to +100	Affects image contrast.
CXGamma	0.1 to 6.0	Affects image brightness.
CXMCM	0 to 999 (see *Description* column for currently supported values)	Medical Color Matching. Optimizes printed image colors to more accurately match monitor output. 0 = MCM disabled 1 = Sony Trinitron 2 = ViewSonic G810 3 = NEC MultiSync 1880SX 4 = NEC MultiSync 1880SX Alternate 1 5 = Sony Trinitron Alternate 1 6 = NP-1600 MCM 6 Equivalent 7 = ViewSonic G810 Alternate 1 8 = Sun Monitor 1 9 = 3D rendering, CRT Monitors 10 = 3D rendering, LCD Monitors 11 = 3D rendering, NEC LED Monitors 12 to 17 = future use 100 to 999 = OEM-specific custom settings
CXPolarity	Positive or Negative	Can be used to reverse image polarity.
CXPriority	Low, Medium, High	Priority of job sent to imager. Higher priority jobs are printed first.
CXSaturation	-100 to 100	A property of color that specifies how far a color is from a gray tone of the same density. Negative settings reduce saturation, positive numbers increase saturation. -100 = no color 0 = normal color saturation 100 = full oversaturation

Table 5-6. Horizon Print Parameters as PostScript DSC Comments That Can Be Set Elsewhere (cont.)

Settings	Allowed Values	Description
CXScale	Box, Bilinear, Mitchell, Bicubic, Lanczos, Sharp1, Sharp2, Sharp3	Specifies the filter to use if the image is being scaled to adjust its size to fit the printable area.

Specifying Horizon Media in a PostScript File

You use the PostScript PageSize comment to specify the Horizon media type and size combination that should be used for the print job. The Horizon media choices that can be included in a PageSize comment are (DV = **DirectVista**; CV = **ChromaVista**):

- HZ-8x10_DVpaper
- HZ-A_DVpaper
- HZ-A4_DVpaper
- HZ-11x14_DVpaper
- HZ-14x17_DVpaper
- HZ-8x10_DVfilm_blue
- HZ-11x14_DVfilm_blue
- HZ-14x17_DVfilm_blue
- HZ-8x10_DVfilm_clear
- HZ-11x14_DVfilm_clear
- HZ-14x17_DVfilm_clear
- HZ-8x10_CVpaper
- HZ-A_CVpaper
- HZ-A4_CVpaper

Sample Horizon DSC Comments in a PostScript File

Following is a sample listing of the Horizon DSC comments portion a PostScript file.

```
%%Begin Feature: *PageSize HZ-8x10_DVFilm_blue
<< /Pagesize [569 708] /ImagingBox null >> setpagedevice
%%EndFeature
} stopped cleartomark
[{
%%BeginFeature: *CXLogicalDevice Unscaled
%CDXFeature: *CXLogicalDevice Unscaled
%%EndFeature
} stopped cleartomark
[{
%%BeginFeature: *OutputBin Middle
%CDXFeature: *OutputBin Middle
%%EndFeature
} stopped cleartomark
[{
%%BeginFeature: *CXAntialias Better
%CDXFeature: *CXAntialias Better
%%EndFeature
} stopped cleartomark
[{
%%BeginFeature: *CXCropMargin False
%CDXFeature: *CXCropMargin False
%%EndFeature
} stopped cleartomark
[{
%%BeginFeature: *CXMarginSize 45
%CDXFeature: *CXMarginSize 45
%%EndFeature
} stopped cleartomark
[{
%%BeginFeature: *CXPrintFMF False
%CDXFeature: *CXPrintFMF False
%%EndFeature
} stopped cleartomark
[{
%%BeginFeature: *CXSkipBlankPages False
%CDXFeature: *CXSkipBlankPages False
%%EndFeature
} stopped cleartomark
[{
%%BeginFeature: *CXGamma 1.5
%CDXFeature: *CXGamma 1.5
%%EndFeature
} stopped cleartomark
[{
%%BeginFeature: *CXContrast 10
%CDXFeature: *CXContrast 10
%%EndFeature
} stopped cleartomark
[{
%%BeginFeature: *CXPolarity Positive
%CDXFeature: *CXPolarity Positive
%%EndFeature
} stopped cleartomark
[{
%%BeginFeature: *CXBackground Dark
%CDXFeature: *CXBackground Dark
%%EndFeature
} stopped cleartomark
[{
```

```
%%BeginFeature: *CXScale Sharp3
%CDXFeature: *CXScale Sharp3
%%EndFeature
} stopped cleartomark
[{
%%BeginFeature: *CXSaturation -10
%CDXFeature: *CXSaturation -10
%%EndFeature
} stopped cleartomark
[{
%%BeginFeature: *CXMCM 1
%CDXFeature: *CXMCM 1
%%EndFeature
} stopped cleartomark
[{
%%BeginFeature: *CXDmax 300
%CDXFeature: *CXDmax 300
%%EndFeature
} stopped cleartomark
[{
%%BeginFeature: *CXDmin 20
%CDXFeature: *CXDmin 20
%%EndFeature
} stopped cleartomark
[{
%%BeginFeature: *CXSheetCoverage Standard
%CDXFeature: *CXSheetCoverage Standard
%%EndFeature
} stopped cleartomark
[{
%%BeginFeature: *CXFilmView Back
%CDXFeature: *CXFilmView Back
%%EndFeature
} stopped cleartomark
[{
%%BeginFeature: *CXLutType Linear
%CDXFeature: *CXLutType Linear
%%EndFeature
} stopped cleartomark
[{
%%BeginFeature: *CXBorderFill True
%CDXFeature: *CXBorderFill True
%%EndFeature
} stopped cleartomark
[{
%%BeginFeature: *CXCaptions False
%CDXFeature: *CXCaptions False
%%EndFeature
} stopped cleartomark
[{
%%BeginFeature: *CXDecimateWarn Default
%CDXFeature: *CXDecimateWarn Default
%%EndFeature
} stopped cleartomark
[{
%%BeginFeature: *CXPriority Default
%CDXFeature: *CXPriority Default
%%EndFeature
} stopped cleartomark
%%EndSetup
```

6

Job, Sheet, and Image Parameters

Job, sheet, and image parameters determine how jobs are printed.

All sheet and image parameters are set in the imager's Default User Settings menu at the control panel. However, the job, sheet, and image parameters can also be specified as listed in Table 6-1.

Table 6-1. Specifying Job, Sheet, and Image Parameters

Print Method	How Parameters Can Be Specified
Sending jobs via DICOM	From within the DICOM user application or by using a Called AE Title matched to one of the Horizon Job Settings files. For more information about DICOM printing, refer to Chapter 4.
Sending PostScript jobs using the imager defined as a Windows or Macintosh desktop printer	From the PostScript settings accessible through the standard Print dialog box. For more information about PostScript printing from Windows or Macintosh, refer to Chapter 5 and to the *Horizon Imager User's Manual*.
Sending non-Windows PostScript print jobs in an FTP session or to the imager defined as an LPR printer	• By including Horizon DSC comments in the PostScript file to set the print parameters. For more information, refer to Chapter 5. • By specifying a Job Settings file when logging in to the FTP session or as part of the imager's LPR printer definition. For more information, refer to Chapters 5 (PostScript printing), 8 (Job Settings), 10 (FTP), and 11 (LPR).

Table 6-1. Specifying Job, Sheet, and Image Parameters (cont.)

Print Method	How Parameters Can Be Specified
Sending bitmap image print jobs in an FTP session or to the imager defined as an LPR printer	• By specifying a Job Settings file when logging in to the FTP session or as part of the imager's LPR printer definition. For more information, refer to Chapters 8 (Job Settings), 10 (FTP) and 11 (LPR). • Using Fixed Multiformatting (FMF) and Variable Multiformatting (VMF) command files. For more information, refer to Chapter 9. • By specifying a User Settings file when logging in to the FTP session, or by printing to the imager using LPR and logged in as a user with a User Settings file loaded in the imager. For more information, refer to Chapters 7 (User Settings files), 10 (FTP), and 11 (LPR).
Print from backup media	• By including a **settings.txt** file in a print set directory on the backup media. For more information, refer to Chapter 12.

The sheet and image parameters are summarized in the *Horizon Imager User's Manual*. This chapter includes more detailed information about all of the parameters, including the job parameters.

Media Type

The media types include **DirectVista** grayscale film and paper/white film, and **ChromaVista** color paper/white film. If not set elsewhere, the imager will default to the media type specified for Grayscale and Color in the Default Media menu at the control panel, depending on whether the received image is grayscale or color.

Possible values are:

- **DVPAPER**
- **PAPER** (mapped to DVPAPER)
- **DVFILMBLU**
- **BLUEFILM** (mapped to DVFILMBLU)
- **DVFILMCLR**
- **CLEARFILM** (mapped to DVFILMCLR)
- **CVPAPER**
- **COLORPAPER** (mapped to CVPAPER)

For all print jobs except PostScript, the image file data (color or grayscale) determines whether the Color or Grayscale default media is chosen. For PostScript, the Grayscale default media is always selected when the media type and size are not otherwise specified.

Media Size

This parameter determines the media size to use. If not set elsewhere, the imager will default to the media size specified for Grayscale and Color in the Default Media menu at the control panel, depending on whether the received image is grayscale or color.

Possible values are listed below, by media type:

DirectVista Paper/White Film:

- **8x10**
- **A**
- **A4**
- **11x14**
- **14x17**

DirectVista Film:

- **8x10**
- **11x14**
- 14x17
- **14x36**
- **14x51**

ChromaVista Paper/White Film:

- **8x10**
- **A**
- **A4**

NOTE: *Some of the media type/size combinations listed here may not currently be available.*

Receive Tray

The Receive Tray parameter—**1**, **2**, or **3**—determines to which receive tray to output sheets for the job. The default is to use the receive tray that corresponds to the supply slot from which the sheets are pulled.

NOTE: *This parameter is not settable at the control panel.*

Priority

The Priority parameter determines the priority of the print job. Higher priority jobs are printed first.

Possible values are:

- **LOW**
- **MEDIUM**
- **HIGH**

NOTE: *This parameter is not settable at the control panel.*

How the Imager Determines the Supply Slot

To determine from which supply slot to pull sheets, the imager looks in sequence from slots 1 to 3 for the media type/size specified in the print job. Once it finds a cassette with the proper media type/size, the imager pulls sheets from that cassette. The imager will continue pulling from that cassette for that media type/size until the cassette is empty, even if a similar cassette is subsequently loaded in a slot above that one.

Sheet Parameters

Overview of the Horizon Sheet Layout

Figure 6-1 on page 6-7 shows the components of the Horizon sheet layout, which are:

- **Physical Media.** The sheet of printed media with all perforated leaders removed. With **ChromaVista** color media, the leaders are not considered part of the physical media.
- **Standard Image Area.** The area **inside** the physical media that should appear straight and centered with the worst-case offset and skew (offset and skew caused by media picking and transport). Note that this is independent of edge blanking, explained in the note below.
- **Full Bleed Image Area.** The area within and without the physical media that should have at least one pixel **outside** each edge of the physical media with the worst-case offset and skew. In other words, each edge of the image will bleed off the edges of the physical media regardless of the skew or offset.
- **Border Area.** The space between the full bleed area and the standard image area.

NOTE: *The imager does not print over the edges of film and instead performs edge blanking to clip the border such that it falls just inside the physical media.*

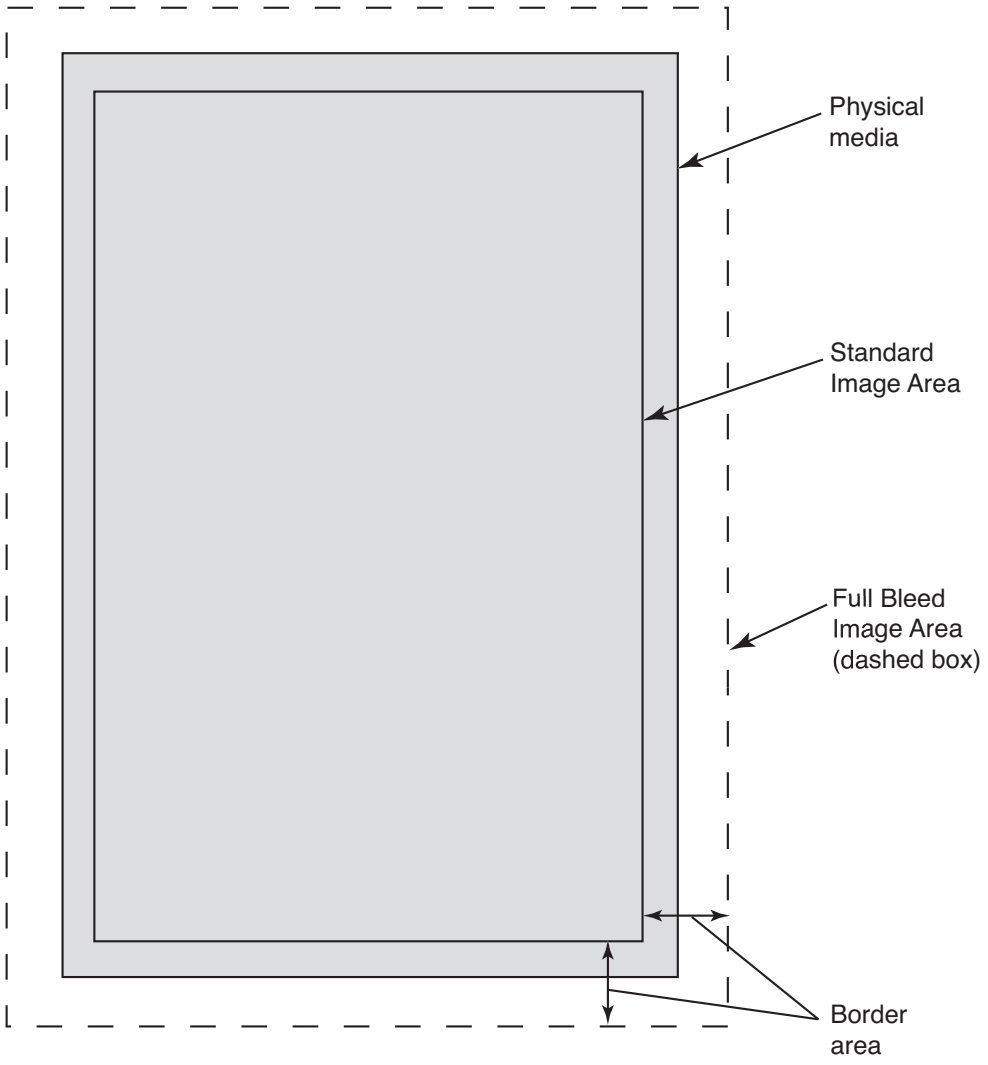


Figure 6-1. Horizon Sheet Layout

NOTE: *The illustration in Figure 6-1 is exaggerated to more clearly point out the sheet layout elements.*

Background

The Background parameter determines the color of areas on the sheet that do not contain image data (that is, the areas between and around images) and do not have the background color set in any other way.

Values that can be set at the control panel are:

- **White** (for paper/white film; the factory default value for paper/white film) or **Clear** (for film)
- **Light Gray**
- **Medium Gray**
- **Dark Gray**
- **Black** (the factory default value for film)

In addition, RGB values can be specified for the background in a Job Settings file (refer to Chapter 8 and Appendix C), and in command files used with Fixed Multiformatting (FMF) and Variable Multiformatting (VMF) printing (refer to Chapter 9). RGB colors are specified as *rr*/*gg*/*bb* where *rr*, *gg*, and *bb* are 2-digit hexadecimal values from 00 (black) to FF (full color) representing red, green, and blue respectively.

Border Fill

NOTE: *The Border Fill parameter is relevant only when the Coverage parameter is set to Standard.*

The Border Fill parameter determines whether the border area is filled with the background color. The possible values are:

- **On** (the factory default for film)
- **Off** (the factory default for paper/white film)

Border fill is implemented in different ways for different media types:

- For **DirectVista** paper/white film, the Border Fill setting is ignored.
- For **DirectVista** film, edge blanking is used to clip the border such that it falls just inside the physical media.
- For **ChromaVista** paper/white film, the border fill prints slightly off the edge of the sheet.

Captions

The Captions parameter determines whether captions will be printed on the sheet. The possible values are:

- **On** (the factory default)
- **Off**

For more information about loading captions and specifying their placement on a sheet, refer to Chapter 13.

Coverage

The sheet Coverage parameter determines whether there will be a border between images and edges of the sheet, or images will bleed off the sheet edges. The possible values are:

- **Standard** (the factory default). The imageable area will be in the Standard Image Area, leaving some border area around the edge of the sheet.
- **Full Bleed** (setting valid for ChromaVista color paper/white film only). The imageable area will be in the Full Bleed Image Area, causing the outside edges of images to bleed off the sheet edges. Full Bleed is most useful for 1-up single image pages, particularly for photographs. Also, for best results, the image should have the same aspect ratio as the physical media.

- **NP.** Causes the imager to emulate a print resolution of 300 dpi for NP series imager legacy support.

Dmax

The Dmax setting allows users to select the maximum optical density of the black component of images printed on **DirectVista** grayscale film. Dmax does not apply to any media types other than **DirectVista** grayscale film.

The possible values for Dmax range from 100 (lightest) to 400 (darkest), corresponding to optical densities 1.00 to 4.00.

NOTE: *The imager currently supports values from 100 to 310. If values higher than 310 are specified, they are mapped to 310.*

NOTE: *Variations in imagers may result in a shift in densities.*

This parameter has the greatest effect on the gray levels closer to black. Higher values increase the density of the dark portion of the image. Lower values decrease the density of the dark portion of the image.

Typical values range from 250 (lightest) to 310 (darkest).

Dmax should be set before other settings (such as Gamma and Contrast) are adjusted.

NOTE: *If the Dmax setting is higher than the film can produce, the film's maximum Dmax setting will be used.*

NOTE for Previous NP Series Users: *For NP series legacy support, the following table lists the allowable NP Dmax settings and to which optical densities they map.*

NP Dmax Setting	Optical Density
1	2.00
2	2.08
3	2.20
4	2.30
5	2.41
6	2.54
7	2.67
8	2.83
9	3.00
10	3.20 (actually mapped to 310)

Dmin

The Dmin setting allows users to select the minimum optical density of the white component of images printed on **DirectVista** grayscale film. Dmin does not apply to any media types other than **DirectVista** grayscale film.

The possible values for Dmin range from 0 (lightest) to 100 (darkest), corresponding to optical densities 0 to 1.00.

This parameter has the greatest effect on the gray levels closer to white. Higher values increase the density of the light portion of the image. Lower values decrease the density of the light portion of the image.

Typically, Dmin should be left at 0.

NOTE: *If the Dmin setting is lower than the film can produce, the film's minimum Dmin setting will be used.*

Film View

The Film View parameter determines the direction from which the film is viewed once it is printed. Film View applies only to **DirectVista** film.

The possible values are:

- **Front** (the factory default). Use this value if the film is to be viewed from the emulsion side.
- **Back**. Use this value if the film is to be viewed from the non-emulsion side.

Image Warnings

Image decimation occurs if pixels are removed from a downscaled image so that it can fit in its cell area on the sheet. The Image Warnings parameter determines whether the message "Warning: Image Decimated" is printed in the corner of a decimated image.

The possible values are:

- **On**
- **Off** (the factory default)

LUT

The LUT parameter determines which look-up table will be used on the images on a sheet. The look-up tables are customized image density curves that affect an image's appearance. LUTs are used so that an image looks correct with a minimal amount of adjustment to the image parameters.

The possible values are:

- **Visual** (the factory default). This value results in visually linear output. This LUT should provide satisfactory results for most applications.
- **Linear**. This value results in measurably linear output, via a densitometer. The Linear LUT should be used only if (1) the data has been precompensated for on the image acquisition system, or (2) the image acquisition system manufacturer instructs you to do so.
- **Custom1** through **Custom9**. Custom LUTs that have been created by the OEM vendor from whom you purchased the Horizon imager. Use these custom LUTs according to the OEM vendor's direction.

Image Parameters

Antialias

NOTE: *The Antialias parameter is valid only for PostScript jobs. It cannot be set at the control panel, included in a Job Settings file, included in User Settings, or included in a Zip disk* ***settings.txt*** *file.*

If antialiasing is enabled, PostScript images are enhanced by rendering them at high resolutions to improve the appearance of text and vector graphics in the printed image.

The possible values are:

- **None.** No antialiasing is performed.
- **Better** (the factory default)**.** A compromise between antialiasing quality and overall print speed. Produces results that are visually equivalent to 600 dpi.
- **Best.** Results in the highest antialiasing quality, but requires the most processing time. Produces results that are visually equivalent to 1200 dpi.

By smoothing the edges of text and vector graphics, antialiasing makes the printed output appear to be better than the resolution of the imager. PostScript vector and text commands produce excellent image quality because they allow images to be scaled up or down to any size with perfect precision. However, PostScript is limited by the imager's physical resolution of 320 dpi. Lines and text printed on sheets may have noticeable "jaggies" or "aliasing" because the image has to be pixelized prior to printing. As a result, edges will not appear perfectly smooth when printed.

With antialiasing enabled for an image, the imager renders the image at several times the standard resolution. The rendered image is then reduced to the standard resolution using a special antialiasing algorithm. This helps retain more of the original image information than would normally be included if the image were rendered directly at the standard resolution. The result is that jagged edges are replaced by smoother edges containing pixels of various intensities.

A PostScript file can also contain bit-mapped components. This data is not mathematically described and may or may not be improved by antialiasing. The deciding factors are how big the original bit map is and the final size of the image on the printed sheet. High resolution bit maps, such as those at greater than 600 dpi, will often be enhanced by antialiasing.

Contrast

Contrast enhancement is an image parameter that allows you to expand and contract the distribution of pixel densities within an image. The level of adjustment is specified by a single value ranging from –100 to +100.

Higher contrast makes light portions of an image lighter and dark portions darker. Lower values make light and dark portions more neutral.

Typical settings range from –10 (reduced contrast) to +25 (increased contrast).

NOTE: *The imager currently supports values from –80 to 80. If values lower than –80 are specified, they are mapped to –80. Likewise, if values higher than 80 are specified, they are mapped to 80.*

The Contrast Curves

The imager adjusts image contrast by applying a *contrast curve* to the image prior to printing (refer to Figure 6-2). The shape of the contrast curve is determined by the *contrast setting*, which is a number ranging from -100 to 100. A setting of 0 results in no change in the image. Settings less than 0 reduce contrast; settings greater than 0 increase contrast.

Increasing contrast increases the differences between light and dark portions of an image so that light areas become lighter and dark areas become darker. Decreasing contrast reduces these differences. By manipulating contrast, you can highlight the most important information within your images, thereby maximizing the usefulness of your prints.

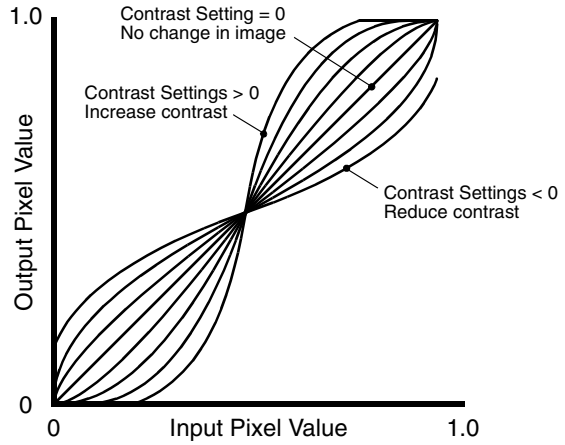


Figure 6-2. Contrast Curves

In Figure 6-2, the pixel values range from 0.0 (pure black) to 1.0 (pure white). As the figure demonstrates, positive contrast settings increase contrast, while negative contrast settings reduce contrast. The larger the contrast setting, the more pronounced the adjustment. Note that, except for large negative settings (large reductions in contrast), pure white and pure black are always left unchanged so that the absolute density range of the image is unaffected.

Gamma

Gamma correction is an image parameter that allows you to adjust the lightness/darkness level of printed images. The amount of correction is specified by a single value ranging from 0.05 to 10.0.

NOTE for Previous NP Series Users: *For NP-series legacy support, negative settings from –10 to –0.5 can be used to specify negative polarity along with the gamma setting. For more information, refer to "Polarity" on page 6-23.*

Why Use Gamma Correction?

Gamma correction allows you to better match the intensity of your prints to what you see on your computer monitor. For instance, an image that appears fine on the monitor might print out darker on the imager. This is because the imager *gamma* (the characteristic traversal from dark to light) is different from that of the monitor.

To fix this problem, you can select a *gamma curve* to be applied to the image before printing that will lighten or darken the overall tone of the image without affecting the dynamic range. The shape of the gamma curve is determined by a number ranging from 0.05 to 10.0 known as the *gamma value*. Figure 6-3 shows several gamma curves demonstrating the effect that the gamma value has on the shape of the gamma curve.

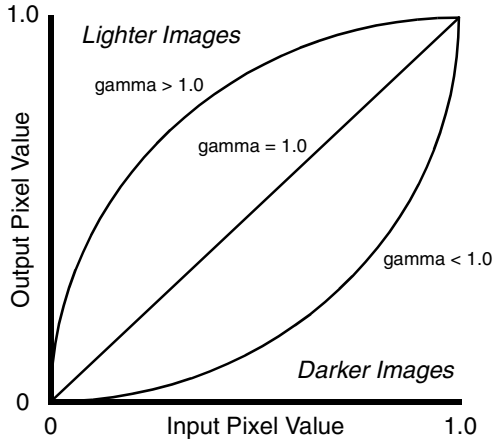


Figure 6-3. Gamma Curves

In Figure 6-3, the pixel values range from 0.0 (pure black) to 1.0 (pure white). As the figure shows, gamma values of less than 1.0 darken an image. Gamma values greater than 1.0 lighten an image, and a gamma equal to 1.0 has no effect on an image.

The actual gamma function used within the imager is:

$$newval(x) = x^{\left(\frac{1}{gammaval}\right)}$$

where *x* is the original pixel value and *gammaval* is the gamma value ranging from 0.05 to 10.0.

This curve is valuable in maintaining the pure black and white parts of the image, while adjusting the values in-between in a smooth manner. The overall tone of an image can be lightened or darkened depending on the gamma value used, while maintaining the dynamic range of the image.

Choosing the Best Gamma Value

An easy approach for choosing the appropriate gamma value is to use the imager's Bracketing feature. Using this feature, an image is printed in two 4 x 5 grids in which gamma and contrast are varied on one sheet and, for **ChromaVista** media, gamma and saturation are varied on a second sheet.

To determine the desired gamma value, you can use the Horizon Bracketing function to examine printed images and see which one looks best to you. For more information about the Bracketing function, refer to Chapter 14.

Combining Gamma and Contrast

Often, gamma correction and contrast enhancement are used together on the imager to achieve the best results.

NOTE: *The Gamma/Contrast Bracketing feature is a very useful tool in determining best results for combining gamma and contrast. For more information on how to use this tool, refer to Chapter 14.*

A fundamental property of contrast is that it splits the gray levels of an image down the middle. When increasing contrast, for example, pixels that are darker than 50% gray are made darker and pixels that are lighter than 50% gray are made lighter. This works fine when the image to be enhanced is already evenly distributed around the 50% gray level. If this is not the case, contrast will not have the desired effect. For instance, if an image is already very dark, with most pixels being darker than 50% gray, then increasing contrast will tend to make the image even darker. Likewise, light images will tend to be made lighter by an increase in contrast.

Gamma correction can be used to overcome this problem. On the imager, gamma correction is applied to an image before contrast enhancement. Because of this, gamma can be used to lighten or darken the image so that it is evenly distributed around the 50% gray level before contrast is applied, causing contrast enhancement to produce the intended result. If a print turns out to be too dark or too light following contrast enhancement, the user need only adjust the gamma value on the imager until the desired output is achieved. For more information, refer to “Gamma” on page 6-17.

Medical Color Matching (MCM)

Codonics Medical Color Matching (MCM) is an advanced image processing feature that adjusts printed output colors to more accurately match monitors. This process corrects differences in hue, saturation, and intensity between the imager and a computer monitor.

The MCM parameter determines for which monitor type MCM should be optimized.

The possible values are:

- **0** (the factory default) = MCM is not enabled
- **1** = Sony Trinitron
- **2** = ViewSonic G810
- **3** = NEC MultiSync 1880SX
- **4** = NEC MultiSync 1880SX Alternate 1
- **5** = Sony Trinitron Alternate 1
- **6** = NP-1600 MCM 6 Equivalent
- **7** = Viewsonic G810 Alternate 1
- **8** = Sun Monitor 1
- **9** = 3D rendering, CRT Monitors
- **10** = 3D rendering, LCD Monitors
- 11 = 3D rendering, NEC LED Monitors
- 12 to 17 = future use
- **100** to **999** = OEM-specific custom settings

NOTE: *MCM profiles for additional monitor types may be added in future releases.*

How Colors Are Produced

Achieving a match between a monitor and printed output has long been a challenge to makers of hardcopy output devices. The reason for the difficulty lies in the physics of color, how it is created by output devices, lighting conditions, and how it is perceived by the human eye.

An image that is displayed on a monitor is composed of combinations of three primary component colors: red, green, and blue. Each primary imparts light of a different wavelength, or color, to the system. A wide array of colors can be created by adding these primaries together in various amounts. This is known as an *additive* process.

Printed output is different in that it creates color by filtering out specific colors from the white light that hits the print media. This is known as a *subtractive* process. By combining the three subtractive primary colors (cyan, magenta, and yellow) in various amounts, a large range of colors can be reproduced.

The Challenge of Color Matching

The difference between the additive and subtractive modes of color generation makes producing a visual match between the monitor screen and the imager hardcopy difficult. Primarily, the screen is able to impart energy to the color system, while the imager can only take energy away. Because of this, monitors typically can produce brighter and more vivid colors, with more dynamic range, than the best hardcopy devices.

Secondly, because hardcopy processes are subtractive, they depend on the outside world to provide a light source. Typically, this light is the ambient light of the room, provided by fluorescent or tungsten lighting. Because light sources vary dramatically in terms of the wavelengths of light they emit, the perceived color or overall cast of a print will differ with changes from one light source to another, and even as the print is moved from room to room.

Codonics Medical Color Matching

Despite these difficulties, the problem of monitor-to-imager color matching is not insurmountable. An advanced set of algorithms has been developed that transforms images between the monitor and imager color spaces so that imager output more closely matches the screen. No special calibration of the monitor is required, and no processing need be done to the images being displayed. This is an important benefit that the Codonics MCM has over other color matching schemes.

The Imager Is Changed, Not the Monitor

Traditional schemes, such as PANTONE and TRUMATCH, require the screen and printer to be calibrated to some industry standard. This means that images must be manipulated before being viewed on the monitor. With MCM, this is not the case. The imager output is adjusted to match the monitor, so that users will see on the screen what they have always seen and will have no uncertainty about the integrity of their screen image. This can be especially important in certain disciplines, including ultrasound, nuclear medicine, PET (Positive Emission Tomography), CT, and MR. In addition, because all MCM processing is performed on the imager, the user's imaging equipment is free to perform more important tasks.

For medical users, MCM technology pays particularly close attention to "medical blues," producing images for the medical market that traditional approaches cannot accomplish.

Nudge

The Nudge parameter adjusts the position of an image on the film by up to 2 mm in any direction.

NOTE: *The Nudge parameter is valid for DICOM printing only.*

Polarity

The Polarity parameter determines whether to invert (or reverse) the image data, which is referred to as *negative* polarity. Negative polarity can be useful in certain applications such as nuclear medicine.

For grayscale images, negative polarity maps black to white, and vice-versa. The negative polarity also applies to color images, mapping colors to their complementary colors.

Note that negative polarity is applied before any other image-enhancement changes, such as gamma, contrast, scaling filters, and so on.

The possible values for Polarity are:

- **Positive** (the factory default). No polarity adjustment is made.
- **Negative**. Image polarity is reversed.

Using Negative Gamma to Specify Negative Polarity (for NP Series Legacy Support)

To accommodate NP series imager legacy support, image polarity can also be specified using a negative gamma value from **–10** to **–0.5**. A negative gamma value indicates to the imager to reverse the polarity of the image data and use the absolute value of the setting value as the gamma setting. For example, the value **–1** would make the polarity negative and specify a gamma setting of **1**.

Rotate

The Rotate parameter specifies whether the image should be rotated 90º counterclockwise on the sheet.

NOTE: *The Rotate parameter is valid only if printing a scaled single-image sheet (Horizon logical device 2).*

The possible values are:

- **Auto** (the factory default). Rotate the image if rotating and scaling it will result in a larger image size than not rotating and scaling it.
- **Never.** Never rotate the image.
- **Always**. Rotate the image, regardless of whether rotating it will result in a larger image size or not.

Saturation

The Saturation parameter allows users to reduce or increase the color saturation of printed images.

Possible Saturation values range from **–100** (no color) to **0** (normal color saturation; this is the factory default) to **100** (full oversaturation).

NOTE for Previous NP Series Users: *True Color Rendering (TCR) values 0 to 100 are mapped to saturation values 0 to -100.*

What Is Saturation?

Saturation is a property of color that specifies how far a color is from a gray tone of the same density. Colors run the gamut from *highly saturated* ones (such as pure red, green, and blue, which have no gray in them at all) to completely *unsaturated* ones, which are pure grays with no color hue in them.

The Saturation parameter is a feature that increases or decreases saturation by removing or adding white to an image. A Saturation value of 0 produces no change in the image, a 0% reduction in saturation. A Saturation value of –100 removes all of the saturation from the image, producing a grayscale output. A Saturation value of 100 adds the maximum amount of saturation to an image.

Why Use Saturation?

Generally, dye-diffusion imagers have the ability to print a large range of densities. This means that the imager can print very black blacks (high Dmax). However, this feature can sometimes cause highly saturated colors (that is, those that are very pure) to print darker than they appear on a workstation monitor. The Saturation parameter allows users to de-saturate and lighten the colors in their prints so that they better match what they see on their monitor.

On the other hand, oversaturating can make colors appear more vibrant, which is desirable in some imaging applications. For example, extra saturation in photographs can bring out details and vibrancy in the images. Note that if the saturation setting is too high, the printed image can include artifacts (due to discontinuities in the color mapping).

Choosing the Saturation Value

You can use the Horizon Bracketing feature (refer to Chapter 14) to print representative images for your site at various Saturation settings. You can then pick the image with the most desirable appearance, and use that image's Saturation setting when printing images in your application.

Note that the default setting **0** is optimized for the smoothest blending of color mapping and grayscale, the maximal number of colors, and accurate sensitometry, but not necessarily for the most vibrant color appearance. Typical settings to use to add vibrancy to an image are 0 to 50.

Scaling

Scaling refers to whether an image is printed at original size, or increased or reduced. The Horizon imager's Scaling parameter determines which filter will be used if scaling is applied to an image as part of a print job.

Scaling Overview

Most computer images are stored as fixed collections of color dots or "pixels." These images are known as *pixel-mapped*, *bit-mapped*, or *raster* images.

Depending on how cell size is set up for an image, it is highly unlikely that the image will fit exactly within that cell without doing some scaling. When scaling is enabled, the imager will scale the image to fit in its allotted cell area, applying the specified filter to determine how to remap (interpolate/extrapolate) the image pixel data. Note that certain filters will have advantages over others in optimizing the final image quality, based on the type of image, the application, and how the image is being scaled (up or down).

Choosing the Right Scaling Filter

The Horizon imager offers several choices of scaling filters, described in Table 6-2. Each filter has unique traits that make it appropriate for different types of images and applications.

For different types of common images used by a site, try using different scaling filters to see which ones generates the best results for your application.

NOTE: *If using the 35mm SlideMaker format (Horizon logical device 135; refer to "Using the 35mm SlideMaker Format" on page 9-34), images are always scaled using the Lanczos filter.*

Table 6-2. Scaling Filters Used by Horizon Imager

Filter	Description	Artifacts
None	No filter is used during scaling. Only available from a DICOM application.	
Box	Box scaling is the fastest of the scaling algorithms. It is implemented using pixel replication. Box should be used for images containing text with block letters for which the text must remain sharp.	Box tends to produce blocky-looking prints, especially when large scale factors are used.
Bilinear	Bilinear scaling is the second-fastest scaling routine. It uses linear interpolation to determine the output image. Bilinear scaling provides very good scaling for most applications for which scale factors are relatively small (4X or less).	Block letters will have fuzzy edges. Bilinear results in a slight decrease in dynamic range for large scale factors.
Mitchell	This filter uses a cubic Mitchell function to produce very smooth output while maintaining dynamic range and sharpness. Mitchell can be used for any scaling application, especially when scaling factors are 2X or greater.	Block letters will have fuzzy edges.
Bicubic	The Bicubic algorithm produces the smoothest output, but tends to smooth over fine details. The filter function is a cubic B-spline filter. This routine requires the same processing time as Mitchell. Bicubic is recommended for applications for which the smoothest output is required.	Images may appear somewhat blurry due to the smoothing of the filter. Block letters will have fuzzy edges.
Lanczos	Lanczos, the imager's factory default filter, is based on the sinc function. The Lanczos filter provides edge-enhancement and is the best filter for retaining the readability of small text.	Lanczos produces ripple or halo artifacts around sharp edges, such as large objects with sharp transitions or large text.
Sharp Filters	There are three Sharp filters, which can improve the crispness of transition areas in an image: • **Sharp1.** Uses a mild edge enhancement function. • **Sharp2.** Uses a moderate edge enhancement function. • **Sharp3.** Uses a strong edge enhancement function.	May make certain images look grainy.

Parameter Selection Process

When the Horizon imager receives a print job, it goes through a predefined sequence of job, sheet, and image parameter sources to determine what parameter settings to use for the job. This sequence varies, depending on how the print job was sent, as shown in Figure 6-4.

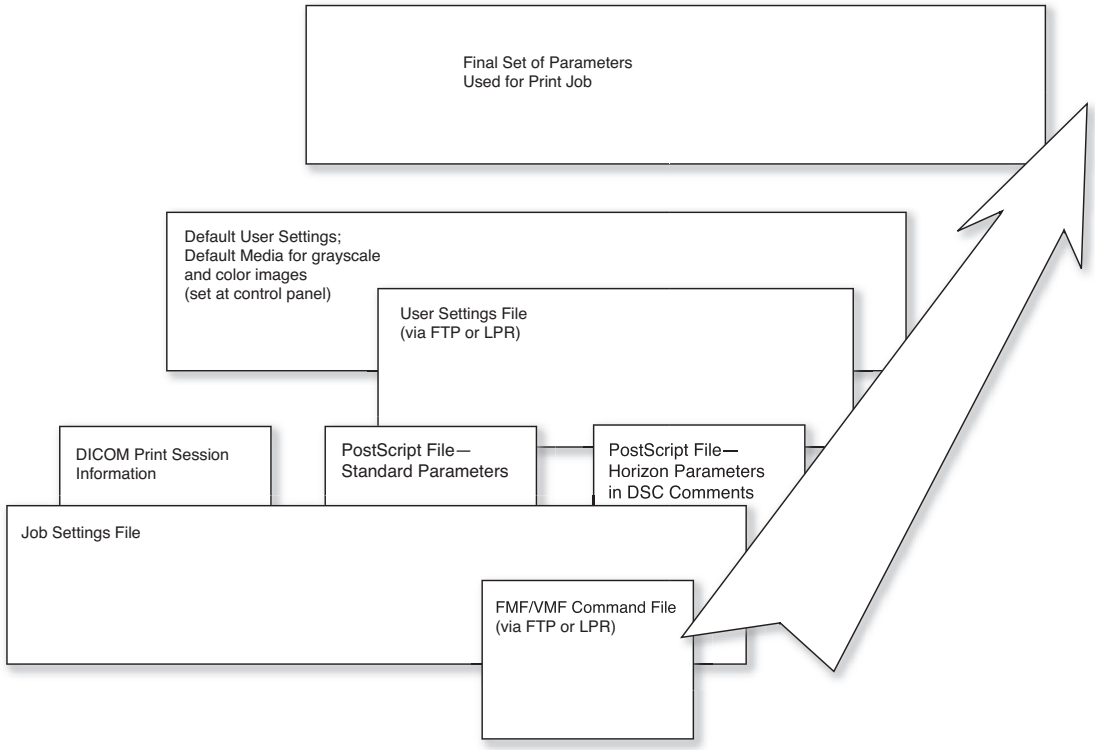


Figure 6-4. Job, Sheet, and Image Parameter Source Hierarchy

For example, say the Contrast parameter is set in a Job Settings file specified for a DICOM print job (via the Called AE Title that is used). As the imager processes the print job to assemble the parameters to use, once it sees the Contrast setting in the Job Settings file, a Contrast value in the DICOM attributes or in the Default User Settings at the control panel are ignored.

Likewise, if the Contrast parameter was not set in the Job Settings file, the imager would default to the Contrast value in the DICOM print session information. If Contrast was not set in either the Job Settings file or in DICOM, the value set in the Default User Settings at the control panel would be used.

Media Selection Process

The methods available to Horizon imager users for selecting the media type and size for a print job can vary widely, depending on the application and operating system environment used to send the print job. To implement the most flexible and efficient method for specifying a Horizon media type and size, it is important that you understand how the imager determines what media size and type to use.

The following steps describe the algorithm used to select the media for a job when it is received. The concept of "application settings" applies to DICOM or PostScript jobs only. An application setting is a parameter implicit in the protocol used to send the print job (such as a DICOM field or a PostScript DSC comment).

1. The print job media type and size are initialized to those of the Default Media settings, based on whether the current job is grayscale or color. This guarantees that they start out with valid values, since only valid media combinations are allowed for Default Media settings.
2. If the media type and/or media size are set by User Settings, then they overlay the current print job media type and/or size, possibly altering their values. Note, however, that the use of User Settings is not recommended.

3. If the media type and/or media size are set by the application for the current job, then they overlay the current print job media type and/or size, possibly altering their values. If not provided by the application, then the print job media type and/or size retain their default value from step 1.
4. If the application indicates a Job Settings file (either system or custom), then the media type and size are processed as follows:
   - If the media type is specified in the Job Settings file, then it overlays the imager default type and the type, if specified, by the application.
   - If the media size is specified in the Job Settings file, then it overlays the imager default size and the size, if specified, by the application.

   This allows the Job Settings file to override both the imager defaults and the values sent by the application.
5. Steps 1 through 3 yield a print job media size and type selection for the current sheet, which is then compared to the imager's valid media list. The valid media list takes into account the model designation and enabled Feature Keys of the current imager.
   - If the print job media combination is **valid** (supported) for the current imager, then the selection is used, and the current sheet is queued for that media.
   - If the media combination is **invalid** (not supported) for the current imager, then the values revert to the Default Media settings, from step 1, since these are guaranteed to be valid. (This also ensures that a print is always queued, regardless of the media indicated by the job and its associated parameters.)

Media Selection Process for DICOM

As an example, the protocol that the imager uses to determine the media size and type for a DICOM print job is as follows:

- **If a Job Settings file is specified,** and it defines a media type and/or size supported by the imager, then that type and/or size are used.
- **If no Job Settings file is specified,** or if the media type and/or size defined in it are not supported, and the print job data from the application defines a supported type and/or size, then that type and/or size is used.
- **If the media type and/or size are not defined in the print job data or in a specified Job Settings file,** or if those specified are not supported by the imager, the type and/or size defined in the Default Media settings (set at the control panel) are used. There are two sets of Default Media settings—one for grayscale images, and one for color images.

Figure 6-5 shows a summary of the DICOM media selection process.

Note that User Settings cannot be used with DICOM print jobs.

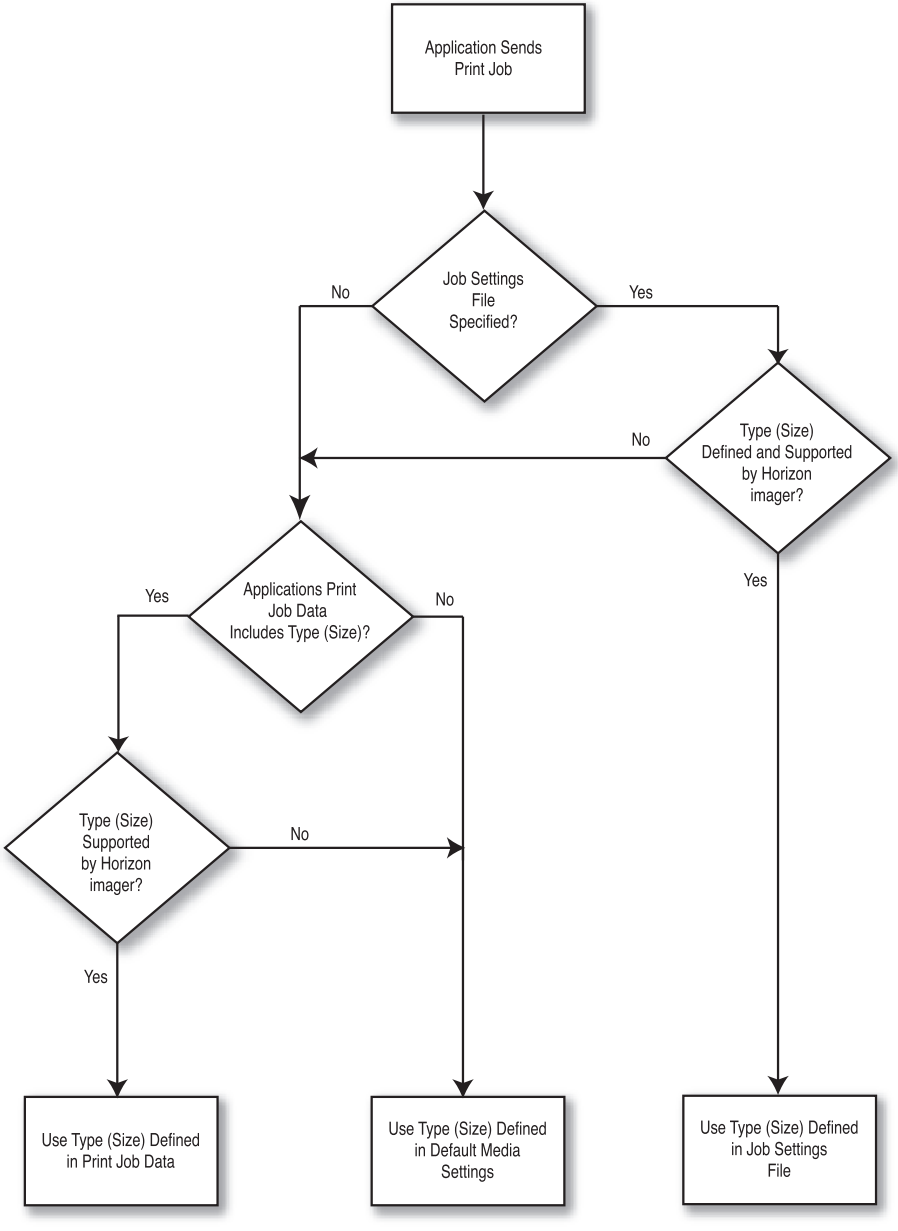


Figure 6-5. Summary of Media Type and Size Selection Process for DICOM Print Jobs

7

Custom User Settings

User Settings files are custom sets of sheet and image parameters that can be stored in the imager and applied by using a specific user name. User Settings are optional and used only when performing single-image, Fixed Multiformatting (FMF), Variable Multiformatting (VMF), or 35mm SlideMaker printing via FTP or LPR.

NOTE: *The User Settings functionality is provided as legacy support for previous NP Series users. It is strongly recommended that users use Job Settings files (refer to Chapter 8) if they want to set custom sets of parameters.*

This chapter explains how to create custom User Settings files, and how to use them to control print job parameters.

CAUTION User Settings files (except the Default User Settings set at the control panel) are not stored on the Smart Card or copied to the Zip disk when saving the imager configuration information. The User Settings files are deleted on each imager reboot. Therefore, make sure you keep a backup of the User Settings text files on another system. The assumption is that a user will always send their User Settings text file at the start of each print session.

NOTE: *The complete set of Default User Settings stored on the imager and accessed from the control panel are actually associated with the default user name* ***root****. So, you can change these settings from the control panel (as described in the* Horizon Imager User's Manual*) or by sending a User Settings text file when logged in as* ***root****.*

NOTE: *If you are printing using FTP or LPR, and are logged in to your print session with a user name that matches an existing User Settings file, the User Settings file will be included in the imager's print parameters selection process.*

User Settings File Parameters

Custom User Settings files can contain any of the sheet or image parameters set in the Default User Settings menu at the imager's control panel. However, there are important differences:

- You do not have to specify all parameters in a User Settings file. Any parameters that are not specified in a User Settings file automatically default to the imager's Default User Settings.
- The imager's Default User Settings values apply to **every** print job, while a custom User Settings file applies only to single-image, FMF, and VMF print jobs sent via FTP and LPR when logged in using the associated user name.

For a complete listing of the sheet and image parameters, and how parameters in custom User Settings files are applied relative to other sources of parameters, refer to Chapter 6.

Creating User Settings Files

To create a User Settings file using text files, you:

1. Create an ASCII text file that contains one or more sheet and/or image settings.
2. Use FTP or LPR to send the User Settings text file to the Horizon imager. Both methods include a way for you to specify to which User Settings file the text file applies.

The following topics explain how to create a User Settings text file, and then transfer it to the Horizon imager.

Creating a User Settings Text File

Use a text editor on your workstation to open a new file for the User Settings text file. Do not use a word processor that embeds control characters and other non-ASCII bytes in the files.

TIP: Suggestions for making ASCII text files

*With UNIX, use a text editor such as **vi**. With Windows or Macintosh systems, either use a text editor (Notepad in Windows, SimpleText in Macintosh OS 9, or Text Editor in Macintosh OS X) or make sure you save the file as a text file from within the word processor application.*

TIP: Naming User Settings files

It does not matter what you call the file. However, you may want to use a descriptive name that will help you identify to which user the file corresponds.

Use the following guidelines to create setting entries in the User Settings text file:

- Enter one setting per text line.
- For each setting you want to specify, enter the setting name and the setting value, separated by a space, a tab character, or an equal sign (for example, `GAMMA=2.3` or `GAMMA = 2.3`).
- You can specify settings that would apply to all media types, or specify settings that apply to specific media types.
  - ***To enter User Settings that apply to all media types,*** enter the heading `[Default]` (including the square brackets), followed by the settings and their values. All the settings following that heading and up to the next media type heading will apply to all media types.
  - ***To enter User Settings for a specific media type,*** enter the media type heading (for example, `[CVPAPER]`), followed by the desired settings and their values. All the settings following that heading and up to the next media type heading will apply to that media type.

NOTE: *The [DEFAULT] heading is optional. Any settings specified without a preceding media type heading are automatically applied to all media types. Custom defaults are overridden by parameters entered for specific media types.*

- Parameters and values are not case sensitive (for example, **MEDIASIZE** is equivalent to **mediasize**). Values need only be specified with as many characters as required to ensure uniqueness, although the minimum is 3 characters (for example, **BIL** is equivalent to **BILINEAR** for the Scale parameter). The exception is that the Mediasize values must be spelled out completely. For a list of the sheet and image parameter names that can be used in the text file, refer to Appendix C.
- You do not have to set all of the settings in the file, only the ones that you want to force to be used when this User Settings file is used. Any settings not set in the file will default those set in the User Default Settings menu at the control panel.

- When the imager processes a User Settings text file, any invalid lines in the file are ignored. In addition, if an invalid combination of media type and media size is indicated, the file is not processed.

Example

The following User Setting text file specifies that all prints for this user be auto-rotated, and printed using negative polarity and Bilinear scaling. However, the gamma and contrast values are assigned differently for each media type. All of the other settings not specified will use those set in the User Default Settings menu at the control panel.

```
[DEFAULT]
ROTATE = AUTO
POLARITY = NEGATIVE
SCALE = BILINEAR

[DVPAPER]
GAMMA = 2.3
CONTRAST = 0

[DVFILMBLU]
GAMMA = 2.25
CONTRAST = 30

[DVFILMCLR]
GAMMA = 2.5
CONTRAST = 25

[CVPAPER]
GAMMA = 2.0
CONTRAST = 15
```

Sending a User Settings Text File to the Imager Using FTP

To send a User Settings file to the imager using FTP

1. From your computer workstation, initiate an FTP session with the Horizon imager.

   For example, from a command line interface, you would enter the **ftp** command with the Horizon imager's IP address or host name (in this sample, 192.168.1.200):

   ```
   ftp 192.168.1.200
   ```

   You are prompted for a user login.

2. Enter the user login name that you want to associate with the User Settings file you are about to create.

   You are prompted for a password.

NOTE: *To send a User Settings file that overwrites those set in the User Default Settings menu at the control panel, use the login name* ***root****.*

3. Enter **0** (the number zero) as the password.

   The combination of the user login name and the **0** password tells the Horizon imager that you are going to be sending a User Settings text file. (The **0** specifies the Horizon configuration logical device; for more information about logical devices, refer to Chapter 9.)

   When the FTP session starts, the FTP prompt (`ftp>`) is displayed.

TIP: Ensuring you are using the correct logical device
When entering a password at the FTP login, the characters are not echoed back to the screen. To ensure that you are using the correct logical device, you can respecify it by entering the ***cd*** *(change directory) command with the logical device as the command's argument. For example:*

```
ftp> cd 0
```

4. Use the FTP **bin** command to set binary transfer mode:

   ```
   ftp> bin
   ```

NOTE: *You must use binary mode when sending files to the Horizon imager, even when sending text files.*

5. Use the FTP **put** command to send the User Settings text file to the imager; for example:

   ```
   ftp> put JoesUserSettings.txt
   ```

   The imager creates a User Settings file—based on the parameters included in the text file—for the user that you logged in as.

6. To end the FTP session, enter the following command:

   ```
   ftp> quit
   ```

CAUTION Sending an invalid file (for example, the file is not a text file, or does not include any setting entries) causes the Horizon imager to delete the corresponding User Settings file, if one exists.

FTP Example

The following example shows how to send a sample User Settings text file (called **LeahSettings.txt**) using FTP:

```
[localhost:~] joe% ftp 192.168.1.200
Connected to 192.168.1.200.
220 horizon FTP server ready.
Name (192.168.1.20:joe): leah
331 Use printer # [0-2, 7, 8, 9, 10, 11-99, 100-104,
135, 150, 300] for password.
Password:0
230 User leah logged in on System device.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> bin
200 Type set to I.
ftp> put LeahSettings.txt
local: LeahSettings.txt remote: LeahSettings.txt
200 PORT command successful.
150 Opening BINARY mode data connection for
LeahSettings.txt.
226 Transfer complete.
9 bytes sent in 0.00151 seconds (5944 bytes/s)
ftp> quit
221 Goodbye.
[localhost:~] leah%
```

Sending a User Settings Text File to the Imager Using LPR

To send a User Settings text file using LPR, the Horizon imager logical device 0 must be set up as an LPR printer (for more information, refer to Chapter 11). Once the logical device 0 LPR printer is set up, log in as the user whose User Settings text file you are about to send. Then, print the User Settings text file to that LPR printer.

The imager will create a User Settings file—based on the parameters included in the text file—for the user that you are logged in as.

Maintaining Your User Settings Files

You can perform the following User Settings file maintenance tasks:

- Display the contents of the User Settings file for a user login name.
- Modify the settings in the file.
- Delete a User Settings file.

Viewing the Current User Settings File for a User Login Name

You can view the imager's Default User Settings menu at the control panel. For detailed procedures, refer to the *Horizon Imager User Manual*.

You can also view both the default and custom User Settings files remotely using a Telnet session.

To view User Settings using Telnet

1. From your workstation, start a Telnet session on the Horizon imager. For example, from a UNIX command line, you would enter the following:

   ```
   # telnet 192.168.1.200
   ```

   where 192.168.1.200 is a sample Horizon IP address.

2. At the login prompt, log in using the **service** login.

For more information about using the **service** login, refer to Chapter 18.

3. At the command prompt, enter the following command:

   ```
   # stat username
   ```

   where *username* is the user name whose User Settings you want to view. To view the imager's Default User Settings, enter **root** as the user name.

   The settings are displayed. Parameters marked with an asterisk (*) indicate that the parameter is not specified in the User Settings file and therefore defaults to the imager default settings.

Modifying a User Settings File

To modify an existing User Settings file

1. Create a new User Settings text file on a workstation, or modify the existing one if it is still stored on the workstation.
2. Send the new file to the imager using FTP or LPR, logged in as the user whose User Settings file you want to update.

   That version of the file will overwrite the one currently stored in the imager.

Deleting a User Settings File

To delete a User Settings file

Reboot the imager. User Settings files are deleted during the reboot operation.

Or

1. At your workstation, create an invalid User Settings text file.

   For example, create a file containing nothing but a space character.

2. Send the invalid file to the imager using FTP or LPR, logged in as the user whose User Settings file you want to delete.

   Since the file is invalid, the imager will automatically delete the existing User Settings file stored for the user you are logged in as.

Using User Settings for Print Jobs

To use a particular User Settings file:

- ***If using FTP to send the print job,*** log in to the FTP session using the corresponding user name. You can then send images for printing using FTP, as described in Chapter 10.
- ***If using LPR to send the print job,*** log in to UNIX using the corresponding user name. You can then send images for printing using LPR printers, as described in Chapter 11.

8

Custom Job Settings

What Are Job Settings?

Job Settings are sets of job, sheet, and image parameters that can be stored as files in the imager and applied by using a specific Job Settings file name. A Job Settings file can be specified in the following ways:

- With DICOM, using the name of the desired Job Settings file as the Called AE Title.
- With FTP, specifying an appropriate Horizon logical device number and the Job Settings file in the FTP session password.
- With LPR, with the Horizon imager set up as an LPR printer whose definition includes an appropriate logical device and Job Settings file in an LPR printer definition. The Job Settings file would also apply to PostScript jobs sent via LPR.

The Horizon imager includes predefined *system* Job Settings files, which specify the various combinations of supported media types and sizes. For more information, refer to “System Job Settings Files” on page 8-3.

You can also create *custom* Job Settings files. For more information, refer to “Custom Job Settings Files” on page 8-3.

Although setting up and using custom Job Settings files may seem complex, they offer significant power and flexibility in how sheets can be printed.

NOTE: *Job Settings—not User Settings—is the preferred method for controlling job, sheet, and image parameters for single-image, Fixed Multiformatting (FMF), and Variable Multiformatting (VMF) printing. Job Settings files are stored on the Smart Card and are copied to backup media when configuration files are being saved, while User Settings files are not.*

Parameters That Can Be Included in Job Settings Files

Job Settings files can contain any of the parameters included in the imager's Default User Settings set at the control panel. However, there are important differences:

- You do not have to specify all parameters in a Job Settings file. Any parameters not set in the file will be selected according to the parameter source hierarchy (for more information about the parameter source hierarchy, refer to "Parameter Selection Process" on page 6-28).
- You can specify the Media Type, Media Size, Receive Tray, and Priority parameters in a Job Settings file, which you cannot do in the Default User Settings menu.
- The imager's Default User Settings values apply to **every** print job (unless overridden by a value set above it in the parameter source hierarchy), while the setting values in a Job Settings file apply only if that Job Settings file is selected.

For a complete listing of the job, sheet, and image parameters, and how Job Settings are applied relative to other sources of parameters, refer to Chapter 6.

System Job Settings Files

Your Horizon imager comes with predefined system Job Settings files for every supported media size and type combination, including the default Grayscale and Color media defined using the Default Media menu at the control panel. There are also system Job Settings files that set the print priority and specify which receive tray to use. For a complete list of the system Job Settings files and which parameters are included in each one, refer to Appendix B.

The system Job Settings files are typically used with DICOM printing, if the DICOM user application does not support specifying media type and size.

NOTE: *The media you are able to use with the imager depends on which options were purchased with your Horizon imager.*

Custom Job Settings Files

In addition to the system Job Settings files that come with your Horizon imager, you can create custom Job Settings files to specify any combination of custom job, sheet, and image parameters.

There are two ways to create custom Job Settings files:

- Using the **Custom Job Settings menu function at the control panel**, as described in the next topic.
- From a workstation on the same network, **creating an ASCII text file** that includes the parameters to be set and then sending the file to the Horizon imager using FTP or LPR. This is explained in "Custom Job Settings—Text Files" on page 8-11.

Custom Job Settings—Control Panel

From the control panel, you can:

- Create custom Job Settings files
- View or edit custom Job Settings files
- Copy custom Job Settings files
- Delete custom Job Settings files

The following topics contain detailed procedures.

NOTE: *Optionally, refer to "Custom Job Settings—Text Files" on page 8-11.*

Creating Custom Job Settings Files from the Control Panel

To create custom Job Settings file from the control panel

1. At the imager's control panel, press and hold the ◀ key, and while holding it press the MENU key.

   The Main Menu with administrative options displays.

2. Select the following menu options:

   Custom Job Settings
   New

   The Name menu displays. The imager provides a default name, **MYSETTINGS*x***, where *x* is a sequentially assigned number.

Menu
Custom Job Settings **New** **Name** '[M]YSETTINGS1_ _ _ _ _'
Edit Name: **Old value:** 'MYSETTINGS1'
Press MENU to exit menus

TIP: Clearing the Job Settings Name

You can clear the Job Settings name by pressing ◀ and ▶ simultaneously.

3. Enter a unique name, or press the ENTER key to use the default name.

   The name can be up to 16 alphanumeric characters, and can include a period (.), dash (-), or underscore (_).

   After pressing the ENTER key, you are prompted to save the name you entered.

NOTE: *For DICOM applications, the name entered here is used as the Called AE Title.*

TIP: Naming Custom Job Settings Files
Use descriptive names that will help you and other users easily identify the parameters included in the custom Job Settings file.

4. Press the ENTER key to save the new Job Settings file with the name you entered.

   You are returned to the New menu, which now displays a list of image and sheet parameters that you can set for the new custom Job Settings file.

5. Use the other menu options in the New menu to specify the parameters for this custom Job Settings file. Press the ENTER key each time to confirm your entry.

NOTE: *You do not have to set all of the parameters, only the ones that you want to force to be used when this custom Job Settings file is used. Any parameters not set in the file will default to the values at subsequent levels of the parameter source hierarchy. For more information about this hierarchy, refer to* *"Parameter Selection Process" on page 6-28.*

6. When you are finished specifying the Job Settings values and want to exit the Main Menu, press the MENU key.

   The custom Job Settings file is stored on the imager, using the name you assigned.

NOTE: *To save the Job Settings file—along with other configuration information—on backup media, refer to the* Horizon Imager User's Manual*. Backing up your configuration information will enable you to restore it to the imager or to load the Job Settings file onto another Horizon imager at your site.*

Viewing or Editing Custom Job Settings Files from the Control Panel

To view or edit a custom Job Settings file

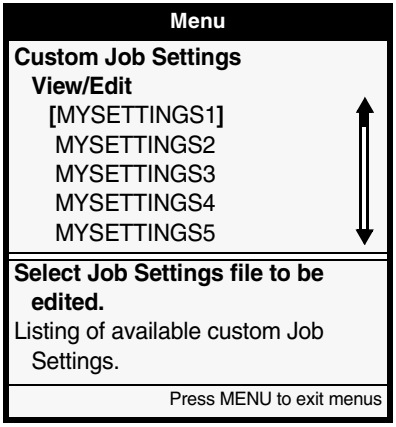
1. At the imager's control panel, press and hold the ◀ key, and while holding it press the MENU key.

   The Main Menu with administrative options displays.

2. Select the following menu options:

   Custom Job Settings
   View/Edit

   The View/Edit menu lists the custom Job Settings files currently stored in the Horizon imager.



NOTE: *You cannot view or change the system Job Settings files that come with the imager.*

3. Select the custom Job Settings file you want to view or modify, then view or modify that file's settings as you would when creating a new one.

Copying Custom Job Settings Files from the Control Panel

You can copy an existing custom Job Settings file to use as the basis for a new one.

To copy a custom Job Settings file

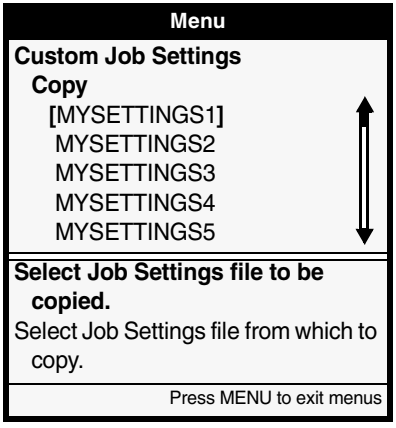
1. At the imager's control panel, press and hold the ◀ key, and while holding it press the MENU key.

   The Main Menu with administrative options displays.

2. Select the following menu options:

   Custom Job Settings
   Copy

   The Copy menu lists the custom Job Settings files currently stored in the imager.



3. Select the custom Job Settings file to be copied.

   A new Job Setting file is created with the default name **COPY***x*, where *x* is a sequentially assigned number.

4. Specify a name and modify the settings as needed, as you would when creating a new one.

Deleting Custom Job Settings Files from the Control Panel

You can delete custom Job Settings files individually, or delete all of them with one operation.

To delete a single custom Job Settings file

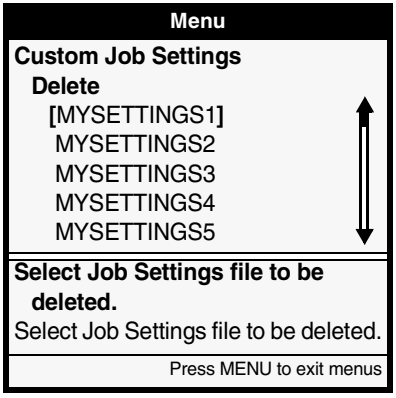
1. At the imager's control panel, press and hold the ◀ key, and while holding it press the MENU key.

   The Main Menu with administrative options displays.

2. Select the following menu options:

   Custom Job Settings...
   Delete...

   The Delete menu lists the custom Job Settings files currently stored in the imager, with the currently selected file in square brackets.



3. Select the custom Job Settings file to be deleted.

   You are prompted to confirm the deletion.

4. *To confirm the deletion,* press the ENTER key.

   To cancel the deletion, press the CANCEL key.

To delete all custom Job Settings files

1. At the imager's control panel, press and hold the ◀ key, and while holding it press the MENU key.

   The Main Menu with administrative options displays.

2. Select the following menu options:

   Custom Job Settings...
   Delete all

   You are prompted to confirm the deletion.

3. *To confirm the deletion,* press the ENTER key.

   To cancel the deletion, press the CANCEL key.

Custom Job Settings—Text Files

To create Job Settings files using text files, you:

1. Create an ASCII text file that contains one or more sheet and/or image settings.
2. Use FTP or LPR to send the Job Settings text file to the Horizon imager. Both methods include a way for you to specify to which Job Settings file the text file applies.

The following topics explain how to create a Job Settings text file, and then transfer it to the Horizon imager.

Creating a Job Settings Text File

Use a text editor on your workstation to open a new file for the Job Settings text file. Do not use a word processor that embeds control characters and other non-ASCII bytes in the files.

Note that custom Job Settings files that you create using text files will appear on the Job Settings control panel menu.

TIP: Suggestions for making ASCII text files
With UNIX, use a text editor such as ***vi****. With Windows or Macintosh systems, either use a text editor (Notepad in Windows, SimpleText in Macintosh OS 9, or Text Editor in Macintosh OS X) or make sure you save the file as a text file from within the word processor application.*

TIP: Naming Job Settings text files
It does not matter what you call the file. However, you may want to use a descriptive name that will help you identify to which Job Settings file the text file corresponds.

NOTE: *Internally, the Horizon imager stores all Job Settings file names as uppercase. When receiving a Job Settings text file or processing a Job Settings name specified in a print job, the Horizon imager first converts all alphabetic characters in the Job Settings name to uppercase.*

Use the following guidelines to create a custom Job Settings text file and enter settings:

- The Job Settings text file name can be up to 256 characters, with no spaces.

NOTE: *You can name the text file anything you want (up to limit 256 characters), but in practice you would want the text file name to match the Job Settings file name (which is limited to 16 characters), to more easily administer the system. All examples in this chapter and elsewhere assume this convention.*

- Enter one setting per text line.
- For each setting you want to specify, enter the setting name and the setting value, separated by a space, a tab character, or an equal sign (for example, `GAMMA=2.3` or `GAMMA = 2.3`).
- Parameters and values are not case sensitive (for example, **MEDIASIZE** is equivalent to **mediasize**). Values need only be specified with as many characters as required to ensure uniqueness, although the minimum is 3 characters (for example, **BIL** is equivalent to **BILINEAR** for the Scale parameter). The exception is that the Mediasize values must be spelled out completely. For a list of the parameter names and values that can be used in the text file, refer to Appendix C.
- To conserve Job Settings files storage on the SmartCard, it is recommended that you do not include parameters for which you simply want to use default settings. Any settings not set in the Job Settings file will be set according to the parameter selection hierarchy.

NOTE: *FMF and VMF command files take precedence over settings set in the Job Settings file. For more information, refer to* *"Parameter Selection Process" on page 6-28.*

- When the imager processes a Job Settings text file, any invalid lines in the file are ignored. For example, if an invalid media type and media size combination is specified, the media type and size are ignored (but other valid entries in the Job Settings file would be processed).

Example

For example, suppose you have determined that certain image parameters—gamma of 1.3, contrast of 5, and saturation of –10—produce images that are satisfactory to a user called Joe. Also, the media type and size will be determined elsewhere (for example, from the DICOM user interface). The entries in the custom Job Settings text file called **JoesPrefs.txt** would have the following entries:

```
GAMMA = 1.3
CONTRAST = 5
SATURATION = -10
```

Now suppose that Joe's DICOM user interface does not support selecting the media type and size, and that Joe typically prints to A-size **ChromaVista** color paper/white film. You could then create a custom Job Settings text file called **JoesASizeCVP.txt** that would have the following entries:

```
MEDIATYPE = CVPAPER
MEDIASIZE = A
GAMMA = 1.3
CONTRAST = 5
SATURATION = -10
```

Let's say you then transfer the text file, specifying the corresponding Job Settings file name as **JOESASIZECVP**. Any time Joe wanted to print to A-size **ChromaVista** color paper/white film, he would specify the Job Settings file called **JOESASIZECVP** by choosing the Called AE Title of the same name as the destination.

Sending a Job Settings Text File to the Imager Using FTP

To send a Job Settings file to the imager using FTP

1. From your computer workstation, initiate an FTP session with the Horizon imager.

   For example, from a command line interface, you would enter the **ftp** command with the Horizon imager's IP address or host name (in this sample, 192.168.1.200):

   ```
   ftp 192.168.1.200
   ```

   You are prompted for a user login.

2. Enter any user login name (it does not matter what the name is).

   You are prompted for a password.

3. Enter **0** (the number zero), followed by a period, then the name of the Job Settings file you want to create.

   For example:

   ```
   0.JOESASIZECVP
   ```

   The combination of the **0** and the name in the password tells the Horizon imager that you are going to be working with the Job Settings file called **JOESASIZECVP**, and to create the file if it does not already exist. (The **0** specifies the Horizon configuration logical device; for more information about logical devices, refer to Chapter 9.)

   When the FTP session starts, the FTP prompt (`ftp>`) is displayed.

NOTE: *It is the name that is appended to the logical device number that determines the Job Settings file name, not the name of the text file being sent.*

TIP: Ensuring you are using the correct logical device and Job Settings file name
When entering a password at the FTP login, the characters are not echoed back to the screen. To ensure that you are using the correct logical device and Job Settings file, you can respecify them by entering the ***cd*** *(change directory) command with the logical device/Job Settings file name as the command's argument. For example:*

```
ftp> cd 0.JOESASIZECVP
```

4. Use the FTP **bin** command to set binary transfer mode:

   ```
   ftp> bin
   ```

NOTE: *You must use binary mode when sending files to the Horizon imager, even when sending text files.*

5. Use the FTP **put** command to send the text file to the imager; for example:

   ```
   ftp> put JoesASizeCVP.txt
   ```

   Upon receiving this command, the imager sets the parameters in the Job Settings file called **JOESASIZECVP** to those defined in the text file **JoesASizeCVP.txt**.

6. To end the FTP session, enter the following command:

   ```
   ftp> quit
   ```

CAUTION Sending an invalid file (for example, the file is not a text file, or does not include any setting entries) causes the Horizon imager to delete the previously stored Job Settings file specified in the FTP password that you entered, if such a Job Settings file already existed.

NOTE: *All Job Settings files are assigned to the imager's* ***root*** *user, not to specific user logins.*

Note that you can always verify whether the Job Settings file was successfully added to the imager from the control panel. For more information, refer to "Viewing or Editing Custom Job Settings Files from the Control Panel" on page 8-7.

The following example shows a sample FTP session used to create a Job Settings file called **JOESASIZECVP** whose parameters are defined in the file **JoesASizeCVP.txt** using FTP:

```
[localhost:~] joe% ftp 192.168.1.200
Connected to 192.168.1.200.
220 horizon FTP server ready.
Name (192.168.1.20:joe): joe
331 Use printer # [0-2, 7, 8, 9, 10, 11-99, 100-104,
135, 150, 300] for password.
Password:0.JOESASIZECVP
230 User joe logged in on System device.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> bin
200 Type set to I.
ftp> put JoesASizeCVP.txt
local: JoesASizeCVP.txt remote: JoesASizeCVP.txt
200 PORT command successful.
150 Opening BINARY mode data connection for
JoesASizeCVP.txt.
226 Transfer complete.
9 bytes sent in 0.00151 seconds (5944 bytes/s)
ftp> quit
221 Goodbye.
[localhost:~] joe%
```

Sending a Job Settings Text File to the Imager Using LPR

Before attempting to use LPR to send a Job Settings text file to the imager, an LPR printer must be created that specifies the Horizon imager's logical device 0 with the name of the Job Settings file appended to it. For more information on Horizon logical devices, refer to Chapter 9. For information on how to specify a Horizon logical device with a Job Settings file name appended to it in an LPR printer definition, refer to Chapter 11.

To send a Job Settings file to the imager using LPR

From your computer workstation, send the Job Settings text file as a print job to the LPR printer defined for the Horizon logical device 0 (the configuration logical device) and the Job Settings file.

For example, assume that you have created an LPR printer called **hzn_joesasizecvp** to correspond to the Job Settings file that you want to use, called **JOESASIZECVP**. The definition for this LPR printer would specify the logical device (in the **/etc/printcap** file, the **rp** parameter) as **0.JOESASIZECVP.**

If the text file for this Job Settings file is called **JoesASizeCVP.txt**, you would enter the following **lpr** command:

```
lpr -Phzn_joesasizecvp JoesASizeCVP.txt
```

***NOTE:** The syntax of the **lpr** command can be different, depending on the operating system, or version of the operating system, you are using. Refer your operating system documentation for details.*

Upon receiving this LPR print job, the imager creates a Job Settings file called **JOESASIZECVP** (if it does not already exist) and sets its parameters to those defined in the text file **JoesASizeCVP.txt**.

Note that you can always verify whether the Job Settings file was successfully added to the imager from the control panel. For more information, refer to "Viewing or Editing Custom Job Settings Files from the Control Panel" on page 8-7.

Maintaining Your Job Settings Files Using Text Files

You can perform the following Job Settings file maintenance tasks using ASCII text files:

- Modify the settings
- Delete a Job Settings file

Even if you used an ASCII text file to create a Job Settings file, you can modify or delete the Job Settings file from the control panel. For more information, refer to "Viewing or Editing Custom Job Settings Files from the Control Panel" on page 8-7 and "Deleting Custom Job Settings Files from the Control Panel" on page 8-9.

Modifying a Job Settings File Using a Text File

To modify a Job Settings file using a text file

1. Create a new text file on a workstation, or modify the existing one if it is still stored on the workstation.
2. Transfer that text file to the imager using FTP or LPR and specifying the appropriate Job Settings file, as described previously.

   The settings specified in the text file will overwrite the previous settings of the specified custom Job Settings file.

Deleting a Job Settings File Using a Text File

To delete a Job Settings file using a text file

1. At your workstation, create an invalid Job Settings text file.

   For example, simply include a space character in the text file.
2. Transfer that text file to the imager using FTP or LPR and specifying the appropriate Job Settings file, as described previously.

   Since the file is invalid, the imager will automatically delete the Job Settings file whose name you specified.

9

Logical Devices and Sheet Formatting

The Horizon imager allows you to specify the following sheet format options when printing using FTP and LPR:

- Printing single-image sheets, both scaled and unscaled.
- Fixed Multiformatting (FMF), using preset fixed layouts of image cells on the sheet.
- Variable Multiformatting (VMF), allowing you to specify the number, size, and layout of image cells on the sheet.
- 35mm SlideMaker, allowing you to print multiple images in a format identical to 35mm slide film. Slides are arranged as six filmstrips of four slides each.

You choose the sheet format option to be used by specifying a Horizon imager logical device number that corresponds to the format option. Logical devices are explained in “Understanding Logical Devices” on page 9-2.

If you are going to print using FTP or LPR and logical devices, you may want to consider using FMF first. FMF is easier to use than VMF. However, both methods offer significant power and flexibility in how sheets can be printed.

Understanding Logical Devices

When sending images to the Horizon imager using FTP or LPR, the imager uses numbers—referred to as *logical devices*—to determine what sheet format option to use. Typically, the number represents the layout of the images on a sheet. For example, an FMF 6-up sheet using a 2-column by 3-row image matrix would be designated by the logical device **23**. There are also other logical device numbers reserved for special uses, such as scaling or not scaling images printed to 1-up sheets.

The following table describes the available logical devices and how they are used.

Table 9-1. Logical Devices

Logical Device	Description
0	Referred to as the *Configuration device*. Without any suffix, indicates to the Horizon imager that you are going to send User Settings files during the current FTP or LPR session. With a period (.) and name appended, indicates to the Horizon imager with which custom Job Settings file you are going to be working. For more information about when to use logical device 0, refer to "Creating User Settings Files" on page 7-3 and "Custom Job Settings—Text Files" on page 8-11.
1	Referred to as the *Unscaled Single-Image device*. Prints at the same number of lines and pixels as the original image, letting the size be determined by the imager's 320-dpi resolution. For example, a 640 x 480 pixel image will print at 2 x 1.5 in. (The image as viewed at a monitor or printed on a different device might be a different size, depending on the device's resolution.) For more information, refer to "Printing Single Unscaled Images" on page 9-7.

Table 9-1. Logical Devices (cont.)

Logical Device	Description
2	Referred to as the *Scaled Single-Image device.* Scales the image to the largest possible size that will fit in the imageable area of the sheet. If the Rotation setting is set to Auto, the image is also automatically rotated if that will result in its being printed at its largest possible size. For more information, refer to “Printing Single Scaled Images” on page 9-6.
3 to 6	Not used.
7	Referred to as the *PostScript Printing device*. The imager uses autosense for any image files sent to devices 1 and 2, to determine the image types. Both of those devices will process a PostScript file if the file has a standard PostScript header. However, device 7 is provided specifically to handle PostScript files, and will process most PostScript files, even those with non-standard headers. This is the recommended device to use for processing PostScript files. Note that multipage PostScript files will print on multiple sheets at the imager.
8	Referred to as the *MCM Bracketing device*. Prints bracketing “test” images using different Medical Color Matching (MCM) values, so you can determine which MCM setting results in the best match between the printed image and the image as displayed on the monitor you are using. For more information about using bracketing to choose MCM values, refer to Chapter 14.
9	Referred to as the *Gamma, Contrast, and Saturation Bracketing device.* Prints bracketing “test” images using different gamma and contrast values—and for **ChromaVista** color media, different gamma and saturation values—so you can choose the best image quality and change settings accordingly. For more information about using bracketing to choose gamma, contrast, and saturation values, refer to Chapter 14.

Table 9-1. Logical Devices (cont.)

Logical Device	Description
10	Referred to as the *Variable Multiformatting (VMF) device.* Enables you to arbitrarily position multiple images on a sheet. You can also specify image-processing options specific to each image (for example, arbitrary clipping, scaling, rotating, and aspect ratio for each image; arbitrary color correction for each image; fill regions of arbitrary size, location, and color; and landscape or portrait orientation). For more information, refer to “Using Variable Multiformatting” on page 9-18.
11–99	Referred to as the *Fixed Multiformatting (FMF) devices.* Enables you to place multiple images on a sheet using preset fixed sheet layouts. A sheet is divided into equal-sized cells, and an image is scaled to fit inside its cell. The first digit in the logical device specifies the number of columns in the image cell matrix, and the second digit specifies the number of rows. For example, logical device **23** corresponds to a 2 x 3-image sheet; logical device **34** corresponds to a 3 x 4-image sheet. If desired, you can use control commands to specify custom print values (for example, orientation, scaling, gap, number of copies, and so on). For more information, refer to “Using Fixed Multiformatting” on page 9-9.
100–104	Referred to as the *Captions devices.* Enables you to install and remove captions on the imager. For more information about captions, refer to Chapter 13.

Table 9-1. Logical Devices (cont.)

Logical Device	Description
135	Referred to as the *35mm SlideMaker device.* Enables you to generate image prints in a format identical to 35mm slide film. For more information, refer to "Using the 35mm SlideMaker Format" on page 9-34.
300	Referred to as the *Software Update device.* Enables you to transfer software updates to the imager. While this option can be used to install updates downloaded from the Codonics web site, you will typically install updates from backup media. Currently not implemented.

Specifying a Logical Device

You specify a logical device by one of the following methods:

- For FTP, entering the logical device number as the password when logging in to the FTP session. For more information, refer to Chapter 10.
- For LPR, using an LPR printer that has been set up for the Horizon imager, defining the printer's logical device setting appropriately (for example, in the **/etc/printcap** file, the **rp** parameter). For more information, refer to Chapter 11.

Printing Single-Image Sheets

Printing Single Scaled Images

Logical device 2 (Scaled device) enables you to print a single image at the largest size that will fit in the imageable area of the sheet. Typically, you will want to send all single images to this logical device.

The image is proportionally scaled and, if the Rotate parameter is set to Auto, automatically rotated if necessary, to ensure that the image prints at the largest possible size. Sheet and image settings are applied to the image and used for the scaling and rotation values. The image is centered on the imageable area of the sheet, accounting for captions if they are used.

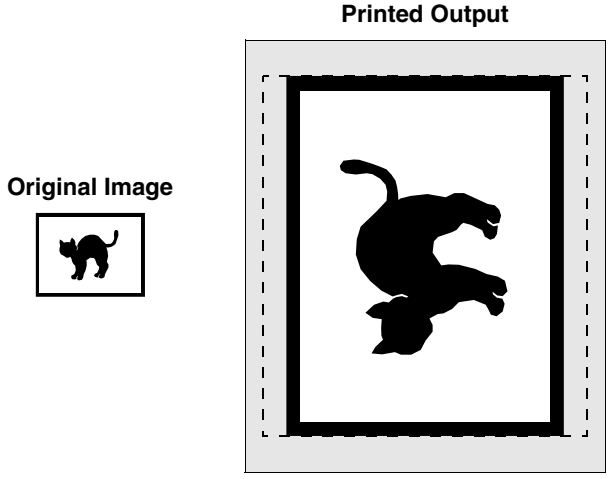


Figure 9-1. Sample Scaled Image Printed Using Logical Device 2

Printing Single Scaled Images Using FTP

To print single scaled images using FTP, you need to log in to the FTP session using logical device number **2** in the password. You can also specify a Job Settings file by appending the logical device number with a period (.) and the Job Settings name. For example:

```
2.MYSETTINGS1
```

You can then send the images in the FTP session.

TIP: Ensuring you are using the correct logical device and Job Settings file name
When entering a password at the FTP login, the characters are not echoed back to the screen. To ensure that you are using the correct logical device and Job Settings file, you can respecify them by entering the ***cd*** *(change directory) command with the logical device/Job Settings file name as the command's argument. For example:*

```
ftp> cd 2.MYSETTINGS1
```

Printing Single Scaled Images Using LPR

To print single scaled images using LPR, you need to create an LPR printer for each logical device 2/Job Settings pair that you anticipate using. For more information on how to do this, refer to Chapter 11.

Once an LPR printer entry exists, you can send images to it. For example:

```
lpr -Phznsinglescaled image.tif
```

Printing Single Unscaled Images

Logical device 1 (Unscaled) is used to print a single, unscaled image on a sheet.

The image is printed using the same number of lines and pixels as the original image. Therefore, the size of the printed image is determined by the Horizon imager's 320-dpi resolution. For example, a 640 x 480 pixel image will print at 2 x 1.5 in. (The image as viewed at a monitor or printed on a different device might be a different size, depending on the device's resolution.).

You should send any one-sheet images that you do not want scaled to the imager using this logical device. All sheet and image settings are applied, except that the image is not scaled.

Raster images that are too large in a given dimension to fit on the imageable area of the sheet are center-cropped (that is, either the right and left edges and/or top and bottom edges are cropped).

Printing Single Unscaled Images Using FTP

To print single unscaled images using FTP, you need to log in to the FTP session using logical device number **1** in the password. You can also specify a Job Settings file by appending the logical device number with a period (.) and the Job Settings file name. For example:

```
1.MYSETTINGS1
```

You can then send the images in the FTP session.

TIP: Ensuring you are using the correct logical device and Job Settings file name
When entering a password at the FTP login, the characters are not echoed back to the screen. To ensure that you are using the correct logical device and Job Settings file, you can respecify them by entering the ***cd*** *(change directory) command with the logical device/Job Settings file name as the command's argument. For example:*

```
ftp> cd 1.MYSETTINGS1
```

Printing Single Unscaled Images Using LPR

To print single unscaled images using LPR, you need to create an LPR printer for each logical device 1/Job Settings file pair that you anticipate using. For more information on how to do this, refer to Chapter 11.

Once an LPR printer entry exists, you can send images to it. For example:

```
lpr -Phznsinglescaled image.tif
```

Using Fixed Multiformatting

Logical devices 11 through 99 enable you to print sheets using preset fixed layouts, referred to as *Fixed Multiformatting* (FMF). If needed, you can customize certain sheet, cell, and fill values to override the imager defaults. The following figure shows the components of a fixed format sheet.

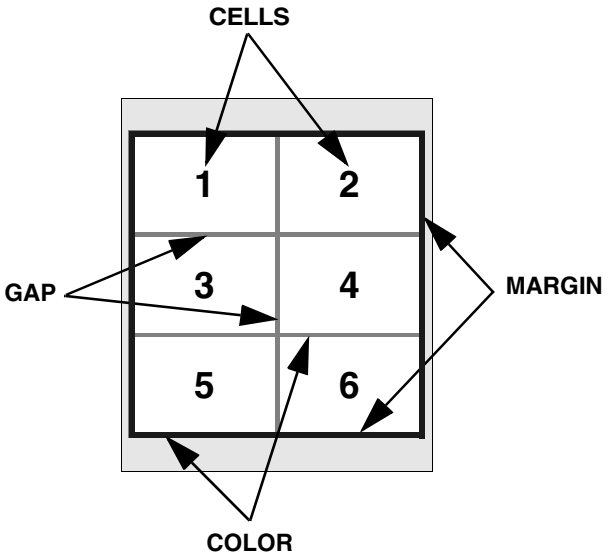


Figure 9-2. Components of a Fixed Format Sheet

You can also specify custom sheet and image settings, including image orientation, border and fill colors, and number of copies, among others.

Any custom values you specify using FMF logical devices override settings specified by other means (for example, Job Settings or the imager default settings).

To use custom sheet, cell, and fill values with FMF, you create ASCII text files that contain control commands, then send the command files to the imager prior to sending the images.

How Images Are Placed on the Sheet

A sheet is divided into equal-sized cells and a single image is scaled to fit inside each cell. The first digit in the logical device specifies the number of images across the sheet, and the second digit specifies the number of images down the sheet. For example, logical device **23** generates a 2 x 3 image sheet; logical device **34** generates a 3 x 4 image sheet.

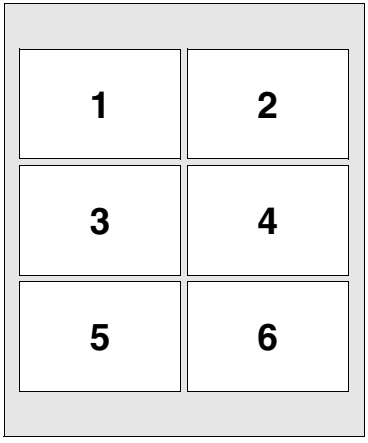


Figure 9-3. Sheet Format Corresponding to Logical Device 23

Images are tracked by your login name/host name combination to keep all images received from a user together on the same sheet. This allows multiple users to print fixed format sheets at the same time.

Images are processed in the order they are received, and placed in the appropriate cells. The sheet is printed automatically when all the cells are filled, or if the user sends a Print command file.

Orientation

Fixed layouts orient the cells so the side of the matrix with the greater number of cells is placed along the longest edge of the paper/white film. If the number of cells on both sides of the matrix is the same, portrait orientation is used. Refer to the following figures.

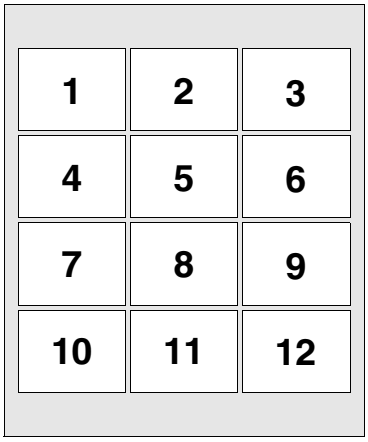


Figure 9-4. Sheet Format Corresponding to Logical Device 34: Portrait Orientation

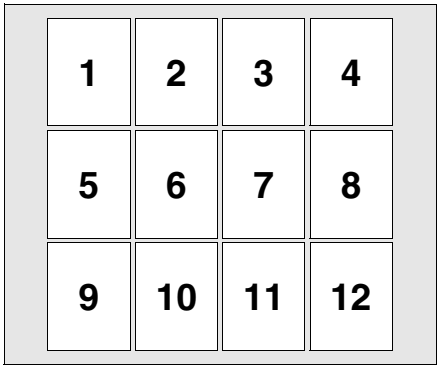


Figure 9-5. Sheet Format Corresponding to Logical Device 43: Landscape Orientation

Creating FMF Command Files

The FMF command files are listed in Table 9-2.

Table 9-2. FMF Commands

FMF Command	Description
Setup	Specifies custom sheet, cell, and fill values to be used during the current FTP session.
Print	Forces the imager to output the current sheet no matter how many images are on it, and resets the imager to begin a new sheet.
Cancel	Clears all images being processed on the current sheet and resets the imager to begin a new sheet.

When the Horizon imager receives a text file during an FTP print session or via LPR, it knows to treat it as a command file and execute the command specified in it.

FMF Command File Conventions

When creating FMF command files, use the following guidelines:

- You can use any name you want for the command file, as long as it is an ASCII text file. Of course, you will probably want to use names that indicate the purpose of the file. For example, if you create a Setup command file for a 6-up sheet format, you might name the Setup command file **setup_6up.txt**.
- Each command file must have only one command.
- The first line of the file must contain the command name.
- The contents of the command files are case-insensitive—you can use upper- or lowercase letters.
- You can use the following delimiters between parameter entries in the file: space characters, tabs, or newline characters (CR or LF).

Setup Command File Contents

The format of a Setup command file is:

```
setup
[landscape | portrait]
[copies c]
[gap g]
[margin m]
[background | color rr/gg/bb]
[cell rr/gg/bb]
[empty rr/gg/bb]
[scale filter]
[aspect x:y]
```

If you do not include an entry for a particular parameter, the default value for that parameter will be used, as set in the custom Job Settings file (if used) or the User Default Settings menu at the control panel.

The following table describes the parameters that can be specified in the Setup command file.

Table 9-3. Setup Command File Parameters

Setup Parameter	Description
setup	Indicates to the Horizon imager that the command file contains a Setup command.
landscape *or* **portrait**	Overrides the default orientation of the cells on the sheet and allows you to specify the orientation.
copies ***c***	Defines the number of copies, ***c***, to be printed of the fixed format sheet. The valid range is 1 to 99. If this parameter is not specified, one copy is printed.
gap ***g***	Defines the size of the space between images. A numeric value, ***g***, from 0 to 999 specifies the number of pixels used to separate images. If a **gap** parameter is not specified, a default value of 3 is used.
margin ***m***	Defines the size space between the outermost image cells and the sheet border. A numeric value, ***m***, from 0 to 999 specifies the number of pixels that form the border of the final image. If a margin value is not specified, a default value of 5 is used.

Table 9-3. Setup Command File Parameters (cont.)

Setup Parameter	Description
background *or* **color** ***rr/gg/bb***	Defines the gap and margin color. Colors are specified as ***rr/gg/bb*** where ***rr***, ***gg***, and ***bb*** are 2-digit hexadecimal values from 00 (black) to FF (full color), which represent red, green, and blue respectively. If no background is specified, the imager goes through the parameter source hierarchy to determine what color to use. The parameter source hierarchy is described in “Parameter Selection Process” on page 6-28.
cell ***rr/gg/bb***	Defines the color for any unused portion inside an image cell. Cell colors are specified as ***rr/gg/bb*** where ***rr***, ***gg***, and ***bb*** are 2-digit hexadecimal values from 00 (black) to FF (full color), which represent red, green, and blue respectively. If no cell color is specified, the imager goes through the parameter source hierarchy to determine what color to use.
empty ***rr/gg/bb***	Defines the color to use for any empty cells. Empty cells occur when a Print command is issued before all cells are filled, and also when an image conversion fails. Image conversion can fail when an unsupported or invalid image format is received, or when image data is corrupted. The empty color is specified as ***rr/gg/bb*** where ***rr***, ***gg***, and ***bb*** are 2-digit hexadecimal values from 00 (black) to FF (full color), which represent red, green, and blue respectively. If no empty color is specified, the imager goes through the parameter source hierarchy to determine what color to use.
scale ***filter***	Specifies what the scaling filter is to be used if the image is being scaled. Supported methods include: box, bilinear, bicubic, mitchell, lanczos, sharp1, sharp2, and sharp3. If **scale** is not specified, the imager goes through the parameter source hierarchy to determine what filter to use.

Table 9-3. Setup Command File Parameters (cont.)

Setup Parameter	Description
aspect *x:y*	Used to scale the images by different amounts in the x and y directions to modify their aspect ratio. With aspect ratio modification, one direction of an image is reduced in size while the other direction is held the same. The aspect ratio factor is determined by ***x*** divided by ***y***. If the aspect ratio factor is less than 1.0, the images are reduced in the x direction in proportion to the factor. If the aspect ratio factor is greater than 1.0, the heights of the images are reduced in proportion to the reciprocal of the aspect factor. Aspect ratio adjustment is performed on the images in the orientation in which they are received. Images with modified aspect ratios are still scaled to fit maximally in the cell.

As an example, the following Setup command file:

```
setup
landscape
copies 5
gap 2
margin 2
background 80/80/80
scale bicubic
```

would cause the sheet to be printed as follows:

- Force landscape orientation
- Make 5 copies
- Use 2-pixel wide lines to frame images, and make the lines 50% gray in color
- Use bicubic scaling for images, if scaling is performed

Print Command File Contents

The entry in the Print command file should be:

```
print
```

or

```
print copies c
```

where *c* is the number of copies, from 1 to 99. If the number of copies is not specified, one sheet is printed.

Cancel Command File Contents

The only entry in the Cancel command file should be:

```
cancel
```

Using FMF During an FTP Session

To use FMF during an FTP session, you need to log in to the FTP session using the FMF logical device number in the password that corresponds to the desired sheet format. You can also specify a Job Settings file by appending the logical device number with a period (.) and the Job Settings file name. For example:

```
23.MYSETTINGS1
```

You can then send FMF commands at any time during an FTP session. The command will apply to the sheet currently being assembled. The Setup command will affect all subsequent sheets, until another Setup command is sent.

TIP: Ensuring you are using the correct logical device and Job Settings file name
When entering a password at the FTP login, the characters are not echoed back to the screen. To ensure that you are using the correct logical device and Job Settings file, you can respecify them by entering the ***cd*** *(change directory) command with the logical device/Job Settings file name as the command's argument. For example:*

```
ftp> cd 23.MYSETTINGS1
```

Using FMF with LPR

To use FMF with LPR, you need to create an LPR printer for each FMF logical device/Job Settings pair that you anticipate using. For more information on how to do this, refer to Chapter 11.

Once an LPR printer entry exists, you can send images to it for printing. You can also use the FMF commands to control the image and sheet settings, and manually force a sheet to print.

To send an FMF command file to the imager using LPR, you simply specify the command file in the **lpr** command. For example:

```
lpr -Phznfmf6up setup6up.txt
```

Using Variable Multiformatting

Logical device 10 is the *Variable Multiformatting* (VMF) device, which enables you to print multiple images on a sheet using arbitrary positioning. That is, you can position images anywhere you want on the sheet. The following figure shows the components of a variable format sheet.

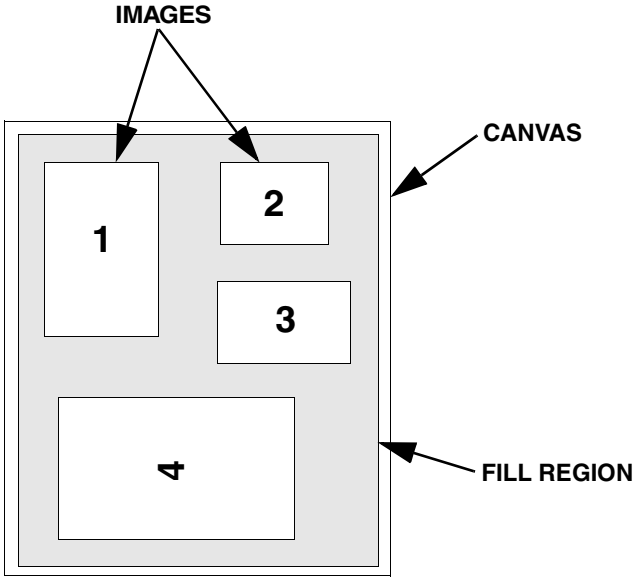


Figure 9-6. Components of a Sheet Using VMF

You can also specify custom sheet and image settings, such as orientation, fill colors, scaling, and color enhancements, among others.

Any custom settings you specify using VMF logical device 10 override settings specified by other means (for example, a Job Settings file or in the User Default Setting menu at the control panel).

To print a sheet using arbitrary positioning and image values, you:

1. Send a Canvas command file to create a “canvas” on which to place the images.
2. Optionally, send Fill command files to specify fill regions on the sheet whose colors are different than the background color (for example, to create frames around an image).
3. For each image on the sheet, send a Place command to specify how to place the image on the sheet and process the image, then send the image file.
4. Print the sheet.

The VMF command files are ASCII text files that contain control commands. These command files are explained in the next topic.

Creating VMF Command Files

The types of VMF command files that can be sent to the Horizon imager are described in Table 9-4.

Table 9-4. VMF Command Files

VMF Command	Description
Canvas	Defines the *canvas*—the region on the sheet of a specified size that acts as the frame onto which images will be placed. Each time this command is sent, the canvas defined by the command replaces the previously defined canvas. The currently defined canvas is valid until a Print command is sent, after which another Canvas command must be sent to set up the next sheet.
Fill	Allows you to specify a solid colored region within the canvas that is a different color than the canvas background. For example, if you wanted to create a colored frame around an image, you would use the Fill command to create a color block slightly larger than the image, then place the image within that color block.

Table 9-4. VMF Command Files (cont.)

VMF Command	Description
Place	Specifies where and how to position the image within the canvas, and optionally, other image adjustments to make. A Place command must immediately precede each image file being sent.
Print	Forces the imager to output the current sheet no matter how many images are on it. Optionally, the number of copies to print can be specified. After processing this command, the Horizon imager removes the current canvas, so that another Canvas command must be sent to set up the next sheet.
Cancel	Clears all images being processed on the current sheet and resets the imager to begin a new sheet. After processing this command, the Horizon imager removes the current canvas, so that another Canvas command must be sent to set up the next sheet.

When the Horizon imager receives a text file during an FTP or LPR print session, it knows to treat it as a command file and execute the command specified in it.

VMF Command File Conventions

When creating VMF command files, use the following guidelines:

- You can use any name you want for the command file, as long as it is an ASCII text file. Of course, you will probably want to use names that indicate the purpose of the file. For example, if you create a Canvas command file specifying an A-size printable area with a black background, you might name the file **canvas_A_black.txt**.
- Each command file must have only one command.
- The first line of the file must contain the command name.
- The contents of the command files are case-insensitive—you can use upper or lower case letters.

- You can use the following delimiters between parameter entries in the file: space characters, tabs, or newline characters (CR or LF).

Canvas Command File Contents

The format of a Canvas command file is:

```
canvas width height
[color rr/gg/bb]
[scale f filter]
[aspect x:y]
[landscape | portrait]
```

If you do not include an entry for a particular parameter, the default value for that parameter will be used, as set in the custom Job Settings file (if used) or the User Default Settings menu at the control panel.

Table 9-5 describes the parameters that can be specified in the Canvas command file.

Table 9-5. Canvas Command File Parameters

Canvas Parameter	Description
canvas	Indicates to the Horizon imager that the command file contains a Canvas command.
width height	**Required.** Defines the width and height (in pixels) of the canvas, which acts as the frame onto which images will be placed. ***width*** and ***height*** dimensions should be less than or equal to the printable area of the sheet. The origin coordinates of the canvas (0,0) are in the upper-left corner. Place and Fill command coordinates are given relative to the canvas origin.
color *rr/gg/bb*	**Optional.** Specifies a background color for the canvas. Colors are specified as ***rr/gg/bb*** where ***rr, gg, and bb*** are 2-digit hexadecimal values from 00 (black) to FF (full color), which represent red, green, and blue respectively. The word **color** must precede the ***rr/gg/bb*** information. If no color parameter is specified, the imager goes through the parameter source hierarchy to determine what background color to use. The parameter source hierarchy is described in “Parameter Selection Process” on page 6-28.

Table 9-5. Canvas Command File Parameters (cont.)

Canvas Parameter	Description
scale ***f filter***	**Optional.** Used to scale the canvas proportionately to a different size. The word **scale** must appear before the scale factor ***f*** and ***filter*** parameters. The **scale** parameter applies to the canvas and all objects within it. ***f*** is a real number greater than 0.0 that specifies how much to scale the canvas. A scale factor of 1.0 leaves the canvas unmodified. A scale factor greater than 1.0 increases the size of the canvas; numbers below 1.0 reduce the size of the canvas. If **auto** is used as the scale factor, the canvas is automatically scaled to the largest size that will fit within the printable area of the sheet. ***filter*** specifies the filter to use to optimize the entire canvas' image quality during scaling. Supported filters include: bilinear, bicubic, box, mitchell, lanczos, sharp1, sharp2, and sharp3. For more information about the available filters, refer to Table 6-2 on page 6-27. If no filter is specified, then filtering is not performed during the scaling operation. If a scale parameter is not specified in the Canvas command, then the imager follows the parameter source hierarchy to determine what scale setting to use (for more information about the parameter source hierarchy, refer to "Parameter Selection Process" on page 6-28).

Table 9-5. Canvas Command File Parameters (cont.)

Canvas Parameter	Description
aspect *x*:*y*	**Optional.** Used to scale the canvas by different amounts in the x and y directions to modify the aspect ratio of the canvas and its contents. The word **aspect** must precede the ***x*:*y*** information. A colon (:) must separate the ***x*** and ***y*** values. The **aspect** parameter applies to the canvas and all objects within it. With aspect ratio modification, one direction is reduced while the other direction is held the same. The aspect ratio factor is determined by ***x*** divided by ***y***. If the aspect ratio factor is less than 1.0, the canvas is reduced in the x direction in proportion to the factor. If the aspect ratio factor is greater than 1.0, the height of the canvas is reduced in proportion to the reciprocal of the aspect factor. The aspect ratio adjustment is always applied after all images and fill regions have been placed on the canvas, but before any orientation adjustment.
landscape or **portrait**	**Optional.** Specifies the orientation of the canvas when the sheet is printed.

Following are examples of the Canvas command:

```
CANVAS 2400 2680
```

Defines an A-size printable area.

```
CANVAS 1024 512
```

Defines a printable area smaller than A-size.

```
CANVAS 2680 2400 LANDSCAPE
```

Defines A-size printable area in landscape mode.

```
CANVAS 1000 800 COLOR FF/00/00
```

Specifies a red background.

```
CANVAS 1200 1340 SCALE 2.0 BILINEAR
```

Scales up 2.0X using the Bilinear filter.

```
CANVAS 1800 1340 ASPECT 1:1.5 SCALE 2.0 BOX
```

Scales width by 1.333 and height by 2.0 using the Box filter.

```
CANVAS 1800 1340 LANDSCAPE ASPECT 1:1.5 SCALE 2.0 BOX
```

Scales width by 1.333 and height by 2.0 using the Box method. Then rotates the canvas and its contents 90° for landscape printing.

Fill Command File Contents

The format of the Fill command is:

```
fill x_offset y_offset fill_width fill_height
[color rr/gg/bb]
```

Table 9-6 describes the parameters that can be specified in the Fill command.

Table 9-6. Fill Command File Parameters

Fill Parameters	Description
fill	Indicates to the Horizon imager that the command file contains a Fill command.
x_offset ***y_offset***	**Required.** Used to specify where to place the fill area on the canvas. The x and y offset integers indicate where the top-left corner of the fill is placed on the canvas. These coordinates are absolute offsets from the origin (top-left corner) of the canvas.
fill_width ***fill_height***	**Required.** Defines a rectangular color fill area on the canvas. The word **fill** must precede the ***fill_width*** and ***fill_height*** parameters.
color *rr/gg/bb*	**Optional.** Specifies a color for the fill region. Colors are specified as ***rr/gg/bb*** where ***rr, gg****, and* ***bb*** are 2-digit hexadecimal values from 00 (black) to FF (full color), which represent red, green, and blue respectively. The word **color** must precede the ***rr/gg/bb*** information. If no color parameter is specified, white is used.

Following are examples of the Fill command:

FILL 0 0 100 100

Defines a 100 x 100 fill region, placed at the top left corner of the canvas. Because no color is specified, white will be used.

FILL 100 200 1000 2000 COLOR 00/00/00

Defines a black 1000 x 2000 fill region.

Place Command File Contents

The format of the Place command is:

```
place x_offset y_offset
[clip clip_width clip_height rr/gg/bb]
[scale f filter]
[aspect x:y]
[center]
[rotate d]
[gamma g]
[contrast c]
[saturation s]
[mcm mid]
```

NOTE: *You will need to create a different Place command file for each image to be placed on the sheet.*

Table 9-7 describes the parameters that can be specified in the Place command.

Table 9-7. Place Command File Parameters

Place Parameters	Description
place	Indicates to the Horizon imager that the command file contains a Place command.
x_offset **and** ***y_offset***	**Required.** Used to specify where to place the next image on the canvas. The x and y offset integers indicate where the top-left corner of the image is placed on the canvas. These coordinates are absolute offsets from the origin (top-left corner) of the canvas.
clip ***clip_width clip_height rr/gg/bb***	**Optional.** Defines a rectangular clip region for the image (that is, a fixed area in which the image will be printed). The word **clip** must precede the ***clip_width*** and ***clip_height*** parameters. If the scale factor ***f*** is not set to **auto**, and either image dimension is larger than the clip region, the image is clipped. Only that portion of the image inside the clip region is printed A color can be optionally specified at the end of the **clip** parameter to define the color for any unused portion inside the clip region. Colors are specified as ***rr/gg/bb*** where ***rr, gg, and bb*** are 2-digit hexadecimal values from 00 (black) to FF (full color), which represent red, green, and blue respectively. If no color is specified, white is used.

Table 9-7. Place Command File Parameters (cont.)

Place Parameters	Description
scale ***f filter***	**Optional.** Proportionally scales the image to a different size on the canvas. The word **scale** must appear before the scale factor ***f*** and ***filter*** parameters. By default, an image is placed without scaling, with one image pixel equaling one canvas pixel. ***f*** is a real number greater than 0.0 that specifies the how much to scale the image. A scale factor of 1.0 leaves the image 1:1. A scale factor greater than 1.0 increases the size of the image; a number below 1.0 reduces the size of an image. When a clip region is specified, **auto** can be used as the scale factor ***f*** to automatically scale the image to the maximum size that will fit in the clip region. ***filter*** specifies the filter to use to optimize image quality during scaling. Supported methods include: bilinear, bicubic, box, mitchell, lanczos, sharp1, sharp2, and sharp3. For more information about the available filters, refer to Table 6-2 on page 6-27. If no filter is specified, then filtering is not performed during the scaling operation. If a scale parameter is specified in a Place command for an image, the image is first scaled and placed on the canvas according to that parameter. Then, if scaling is specified in the Canvas command, the image will also be scaled and filtered as part of the entire canvas scaling and filtering.
aspect ***x*:*y***	**Optional.** Scales the image by different amounts in the x and y directions to modify its aspect ratio. The word **aspect** must precede the ***x*:*y*** information. A colon (:) must separate the ***x*** and ***y*** values. With aspect ratio modification, one direction is reduced while the other direction is held the same. The aspect ratio factor is determined by ***x*** divided by ***y***. If the aspect ratio factor is less than 1.0, the image is reduced in the x direction in proportion to the factor. If the aspect ratio factor is greater than 1.0, the height of the image is reduced in proportion to the reciprocal of the aspect factor. Aspect ratio adjustment is applied to the image first, before any other Place operations, notably scaling and rotation.

Table 9-7. Place Command File Parameters (cont.)

Place Parameters	Description
center	**Optional.** If included, the image is centered within its clip region. If the scale factor ***f*** is not set to **auto**, and either image dimension is larger than the clip region, the image is center-clipped (that is, its right and left edges, or top and bottom edges, are clipped). If the **center** parameter is not included and the image (after any required rotating and scaling) is bigger than the defined clip region, the image is placed flush top and flush left in its cell. Any portion of the image that is past the right and bottom margins of the cell is clipped.
rotate *d*	**Optional.** Allows the current image to be rotated counterclockwise in 90° increments. Valid values for degrees, *d*, are: **0**, **90**, **180**, **270**, and **auto**. If **auto** is specified, the current image is rotated either 0 or 90° so as to produce the largest final image size within the clip region. If **auto** is specified without a clip region, rotation is ignored.
gamma *g*	**Optional.** Applies gamma correction to the image. For information about gamma settings, refer to “Gamma” on page 6-17.
contrast *c*	**Optional.** Applies contrast enhancement to the image. For information about contrast settings, refer to “Contrast” on page 6-15.
saturation *s*	**Optional.** Applies saturation correction to the image. For information about saturation settings, refer to “Saturation” on page 6-24.
mcm *mid*	**Optional.** Applies Medical Color Matching (MCM) correction to the image. For information about MCM settings, refer to “Medical Color Matching (MCM)” on page 6-20.

Following are examples of the Place command:

PLACE 0 0

Places the unclipped image at the top left corner of the canvas.

PLACE 0 500 CLIP 250 350

Places the image flush left and 500 pixels from the top of the canvas. Clips the image to a 250 x 350 pixel region.

PLACE 500 500 SCALE 1.66

Places the image 500 pixels from the left and 500 pixels from the top of the canvas. Scales the image up 1.66X using the scaling filter specified in the Canvas command.

PLACE 1000 500 CLIP 400 200 SCALE AUTO BOX ROTATE AUTO CENTER

Places the image 1000 pixels from the left and 500 pixels from the top of the canvas. Defines a 400 x 200 clip region, scales the image to fit in the clip region using the Box filter, allows the image to be rotated if that will produce the larger image size, and centers the image in the clip region.

PLACE 1000 1000 CLIP 300 300 A0/A0/A0 CENTER

Places the image 1000 pixels from the left and 1000 pixels from the top of the canvas. Defines a 300 x 300 clip region, specifies that a light gray should be used as the color in any unused portions of the clip region, and centers the image in the clip region.

PLACE 0 1500 CLIP 500 500 40/40/00 SCALE 0.25 MITCHELL CENTER

Places the image flush left and 1500 pixels from the top of the canvas. Defines a 500 x 500 clip region, specifies that a dark gray should be used as the color in any unused portions of the clip region, scales the image to 25% of its original size using the Mitchell filter, and centers the image in the clip region.

```
PLACE 0 1500 ROTATE AUTO GAMMA 2.0 CONTRAST 5
```

Places the unclipped image flush left and 1500 pixels from the top of the canvas. Since no clip region is specified, causes the rotation to be ignored; sets gamma to 2.0; and sets contrast to 5.

Print Command File Contents

The entry in the Print command file should be:

```
PRINT
```

or

```
PRINT COPIES c
```

where *c* is the number of copies, from 1 to 99. If the number of copies is not specified, one sheet is printed.

Cancel Command File Contents

The only entry in the Cancel command file should be:

```
cancel
```

Sample VMF Command Session

The following sequence of VMF command files formats two images on a sheet and prints the sheet.

Canvas Command File:

```
CANVAS 1500 2000 COLOR 00/00/00 PORTRAIT
```

Creates a canvas 1500 pixels wide and 2000 pixels high that is set to the color black. The canvas will be printed in portrait mode.

Place Command File:

```
PLACE 10 10 CLIP 1480 980 SCALE AUTO BILINEAR
```

Places the subsequent image 10 pixels to the right and 10 pixels down from the canvas origin. Defines a clip region of 1480 x 980 pixels, and scales the image using the Bilinear filter to its largest possible size within the clip region.

Image File:

chest1.jpg *(image is 1152 x 900 pixels)*

Image is automatically scaled to the maximum size that fits within the clip region.

Place Command File:

```
PLACE 10 1000
```

Places the next image 10 pixels to the right and 1000 pixels down from the canvas origin.

Image File:

chest2.tif *(image is 1024 x 512 pixels)*

Image is placed on the canvas with the bottom 12 pixels truncated because they extended past the bottom of the Canvas, which is 1500 pixels high.

Print Command File:

```
PRINT COPIES 5
```

Five copies of the sheet are printed.

Using VMF During an FTP Session

After you create the command files, you can start the FTP session and print the sheet.

To print using VMF, use the following general steps:

1. Use the logical device **10** as the FTP password. This tells the Horizon imager that the FTP session should print sheets using VMF. You can also specify a Job Settings file by appending the logical device number with a period (.) and the Job Settings name. For example:

   ```
   10.MYSETTINGS1
   ```

TIP: Ensuring you are using the correct logical device and Job Settings file name
When entering a password at the FTP login, the characters are not echoed back to the screen. To ensure that you are using the correct logical device and Job Settings file, you can respecify them by entering the ***cd*** *(change directory) command with the logical device/Job Settings file name as the command's argument. For example:*

```
ftp> cd 10.MYSETTINGS1
```

2. Specify binary mode for the FTP session by executing the FTP **bin** command.

NOTE: *You must use binary mode when sending files to the Horizon imager, even when sending text files.*

3. Send a Canvas command file to set up the sheet for printing.
4. Optionally, send Fill commands to create colored blocks on the sheet (for example, to create a frame around an image's clip region).
5. For each image, send its corresponding Place command, then send the image file.
6. When you are ready to print the sheet, send the Print command.

Note that you must send a Canvas command for each sheet to be printed. Canvas command information is not saved once a sheet is printed.

For detailed information on how to use FTP to send files to the imager, refer to Chapter 10.

Using VMF with LPR

To use VMF with LPR, you need to create an LPR printer for each VMF/Job Settings file pair that you anticipate using.

Once an appropriate LPR printer exists, configured to specify the VMF logical device (10) and the desired Job Settings file, you can send images to it for printing using the following general steps:

1. Print a Canvas command file to set up the sheet for printing. For example:

   ```
   lpr -Phznvmfcustom1 MyCanvas.txt
   ```

2. Optionally, print Fill command files to create colored blocks on the sheet (for example, to create a frame around an image's clip region).
3. For each image, print its corresponding Place command file, then print the image file.
4. When you are ready to print the sheet, print the Print command file.

Note that you must print a Canvas command for each sheet to be printed. Canvas command information is not saved once a sheet is printed.

For more information on how to do set up LPR printers, refer to Chapter 11.

Using the 35mm SlideMaker Format

Logical device **135** is the 35mm SlideMaker device, which allows you to print multiple images in a format identical to 35mm slide film. The 35mm SlideMaker fits 24 slides, or cells, on a sheet. The slides are arranged as six filmstrips of four slides each. The slides can then be cut out of the film, mounted in standard 35mm slide mounts, and projected using a standard 35mm slide projector.

How Images Are Placed on the Sheet

Images sent for printing using the SlideMaker format are scaled and rotated, if necessary, to produce the largest possible image in each cell.

Images are tracked by your login name/host name combination to keep all images received from a user together on the same sheet. This allows multiple users to print 35 mm sheets at the same time.

The sheet and image parameters are determined using the Horizon imager's parameter source hierarchy, just as with FMF and VMF. (The parameter source hierarchy is described in "Parameter Selection Process" on page 6-28.) The images are scaled using the Lanczos method, which is used because it give the best results for downscaled images. The sheet is printed automatically when all cells on the sheet have been filled, or if you send a Print command file.

Figure 9-7. Sample Images Printed Using the SlideMaker Format

Printing Images Using the SlideMaker Format

You print images using the SlideMaker format just as you would using the FMF formats, except that:

- You use logical device number 135.
- The Setup command file has only two parameters: Copies and Aspect. These two parameters are set in the same way as the FMF Copies and Aspect parameters. For a description of these parameters, refer to Table 9-3 on page 9-13.

10

Sending Print Jobs Using FTP

FTP (File Transfer Protocol) is a protocol that enables you to login to the Horizon imager from your workstation and send image files for printing. You can also send text files containing custom commands and parameters used to set up your sheets and process images.

FTP uses the TCP/IP networking protocol and is available for most computer platforms, including UNIX, Linux, MS-DOS/Windows, and Macintosh.

The procedures in this chapter explain how to FTP image files from a command window on your workstation. If you are using a GUI-based FTP application, you will likely click buttons and drag files from one window to another instead of entering commands. While the user interface may vary between implementations of FTP, the information required to connect to the imager and send files is the same.

Printing Single-Image and FMF Sheets

To print single-image or Fixed Multiformatting (FMF) sheets, you start an FTP session with the imager, login to the FTP session using a logical device as the password to indicate what format to use, then send one or more images to be printed on the sheet.

To print a single-image or FMF sheet

1. From your computer workstation, open a command window.
2. To start the FTP session, at the command prompt enter the following command:

   `ftp x.x.x.x`

   where *x.x.x.x* is the IP Address of the Horizon imager to which you want to send the print job.

NOTE: *The imager tracks print jobs by the source user name and host name or IP address. Therefore you should use unique user names if running multiple print sessions from the same host system.*

   FTP connects with the imager and you are prompted to log in.

3. At the login prompt, enter your user name.

   If you are not using User Settings, login as **root** to ensure that print jobs will use only the settings defined in the Default User Settings menu at the control panel (and not those of another user).

   If you are using User Settings, enter the corresponding user name.

NOTE: *Because the imager tracks print jobs by the source user login/host, it is recommended that you use a name that is unique among the imager's users.*

   You are prompted for a password.

4. At the password prompt, enter the Horizon logical device number that represents the sheet format you want to use:

   - ***To print a single image,*** enter **1** (unscaled) or **2** (scaled).
   - ***To print multiple images on a sheet using FMF,*** enter the number from **11** to **99** that corresponds to the sheet format you want to use. For more information about FMF, refer to Chapter 9.
   - ***To specify a Job Settings file,*** append a period (.) and the Job Settings file name after the logical device number. For example:

     ```
     Password: 23.MYSETTINGS1
     ```

   You are logged in to an FTP session on the imager.

TIP: Ensuring you are using the correct logical device and Job Settings file name
When entering a password at the FTP login, the characters are not echoed back to the screen. To ensure that you are using the correct logical device and Job Settings file, you can respecify them by entering the ***cd*** *(change directory) command with the logical device/Job Settings file name as the command's argument. For example:*

```
ftp> cd 23.MYSETTINGS1
```

5. Specify that you want to transfer files in *binary* mode (also called the *image* mode) by entering the following command:

   ```
   ftp> bin
   ```

   You can now begin transferring image files to the imager.

NOTE: *You must use binary mode when sending files to the Horizon imager, even when sending text files.*

6. Before sending an FMF print job, send a Cancel command file to clear out any data from the previous sheet. (For more information about the FMF commands, refer to "Creating VMF Command Files" on page 9-19.)

   ```
   ftp> put cancel.txt
   ```

7. Use the FTP **put** command to send one or more images to the imager; for example:

   ```
   ftp> put image1.tif
   ftp> put image2.tif
   ```

   You can also specify multiple files in one FTP **mput** command. For example:

   ```
   ftp> mput image1.tif image2.tif
   ```

   Multiple files are placed sequentially in the cells on the sheet, moving from left to right, top to bottom.

   Once a sheet is full, it is automatically printed. To force an unfilled sheet to print, send a Print command.

8. After a sheet is filled (and automatically printed) or forced to be printed with a Print command, send a Cancel command file to clear out any data from the previous sheet.
9. To send another print job using the same sheet format, use the **put** command to send the image(s) to the imager.
10. When you are finished sending images to be printed and want to close the FTP session, enter **quit**.

There are some other common operations that you may want to perform during an FTP session. These are described in the following table.

Table 10-1. Additional Common FTP Printing Operations for Single-Image or FMF Sheets

To:	Do This:
Print multiple copies of the same single-image sheet	Include the number of copies after the image file name in the **put** command. For example: `ftp> put image.tif 3`
Print multiple copies of an FMF sheet	Send an FMF Setup command file that includes the Copies parameter. For more information, refer to “Setup Command File Contents” on page 9-13.

Table 10-1. Additional Common FTP Printing Operations for Single-Image or FMF Sheets (cont.)

To:	Do This:
Cancel printing images already sent	Use the FMF Cancel command. Note that this works only for a sheet that has not been filled with images yet or forced to print using a Print command file. For more information, refer to “Cancel Command File Contents” on page 9-16.
Change the sheet format being used	Enter the **cd** (change directory) command, followed by the corresponding logical device number. For example: `ftp> cd 34` This command causes the current sheet to print using the previous format, and starts a new sheet with the new format.
Change the Job Settings file being used	Enter the **cd** (change directory) command, followed by the corresponding logical device number and Job Settings file name. For example: `ftp> cd 34.MYSETTINGS2` This command causes the current sheet to print using the previous format, and starts a new sheet with the new format and Job Settings. Note that if you do not specify a Job Settings file with the **cd** command, no Job Settings file is used with subsequent print jobs, until one is specified again.

Table 10-1. Additional Common FTP Printing Operations for Single-Image or FMF Sheets (cont.)

To:	Do This:

To send a group of image files without having to list them all	First, change the current directory to the one in which the images are stored using one of the following methods:
	• Change the current directory before starting the FTP session. For example, in UNIX use the **cd** command.
	• In the FTP session, use the FTP **lcd** command. For example:
	`ftp> lcd /myimage_directory`
	Then, use the **mput** command, with wildcards in the filename argument. For example:
	`ftp> mput *.tif`
	Any time you use **mput**, you will be prompted to confirm each file before sending. To turn off this prompting, enter the **prompt** command before the **mput** command. To turn prompting back on, enter **prompt** again.
	On most systems, the images will be placed in alphabetical order. If you want to force a certain sequence, name the image files accordingly.

Sample FTP Sessions for Single-Image and FMF Sheets

In the following example, a user (logged in as **root** so a User Settings file is not accidently used) is printing one scaled image, called **image.gif**, to the Horizon imager with an IP address of 192.168.1.200.

```
[localhost:~] joe% ftp 192.168.1.200
Connected to 192.168.1.200.
220 horizon FTP server ready.
Name (192.168.1.20:joe): root
331 Use printer # [0-2, 7, 8, 9, 10, 11-99, 100-104,
135, 150, 300] for password.
Password:2
230 User root logged in on System device.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> bin
200 Type set to I.
ftp> put image.gif
local: image.gif remote: image.gif
200 PORT command successful.
150 Opening BINARY mode data connection for image.gif.
226 Transfer complete.
9 bytes sent in 0.00151 seconds (5944 bytes/s)
ftp> quit
221 Goodbye.
[localhost:~] joe%
```

In the following example sequence of commands, a user is printing 2 copies of a 6-up sheet using a custom Job Settings file, then printing 1 copy of 3 images on a 4-up formatted sheet using a different custom Job Settings file:

```
% ftp 192.168.1.200
Name: john
Password: 23.MYSETTINGS1
ftp> bin
ftp> put setup2copies.txt
ftp> put chest1.gif
ftp> put chest2.gif
ftp> put chest3.gif
ftp> put chest4.gif
ftp> put chest5.gif
ftp> put chest6.gif
ftp> cd 22.MYSETTINGS2
ftp> put lowerarm1.gif
ftp> put lowerarm2.gif
ftp> put lowerarm3.gif
ftp> put print1.txt
ftp> quit
```

Alternately, the **mput** command could be used to avoid entering a **put** command for each image file. The following example shows this technique for the print jobs described above. In this example, the image files are stored in the directory **/myimages**, and prompting to confirm each file's transfer has been turned off:

```
% ftp 192.168.1.200
Name: john
Password: 23.MYSETTINGS1
ftp> bin
ftp> lcd /myimages
ftp> prompt
ftp> put setup2copies.txt
ftp> mput chest*.gif
ftp> cd 22.MYSETTINGS2
ftp> mput lowerarm*.gif
ftp> prompt
ftp> put print1.txt
ftp> quit
```

Printing VMF Sheets

To print VMF sheets, you start an FTP session with the imager, login to the FTP session using logical device 10 as the password, then send a series of command files and image files for the sheet.

To print a VMF sheet

1. From your computer workstation, open a command window.
2. To start the FTP session, at the command prompt enter the following command:

   `ftp x.x.x.x`

   where *x.x.x.x* is the IP Address of the Horizon imager to which you want to send the print job.

NOTE: *The imager tracks print jobs by the source user name and host name or IP address. Therefore you should use unique user names if running multiple print sessions from the same host system.*

   FTP connects with the imager and you are prompted to log in.

3. At the login prompt, enter your user name.

   If you are not using User Settings, login as **root** to ensure that print jobs will use only the settings defined in the Default User Settings menu at the control panel (and not those of another user).

   If you are using User Settings, enter the corresponding user name.

NOTE: *Because the imager tracks print jobs by the source user login/host, it is recommended that you use a name that is unique among the imager's users.*

   You are prompted for a password.

4. At the password prompt, enter the VMF logical device number, **10**.

   Optionally, to specify a Job Settings file, append a period (.) and the Job Settings file name after the logical device number. For example:

   ```
   Password: 10.MYSETTINGS2
   ```

   You are logged in to an FTP session on the imager.

TIP: Ensuring you are using the correct logical device and Job Settings file name
When entering a password at the FTP login, the characters are not echoed back to the screen. To ensure that you are using the correct logical device and Job Settings file, you can respecify them by entering the ***cd*** *(change directory) command with the logical device/Job Settings file name as the command's argument. For example:*

```
ftp> cd 10.MYSETTINGS2
```

5. Specify that you want to transfer files in *binary* mode (also called the *image* mode) by entering the following command:

   ```
   ftp> bin
   ```

NOTE: *You must use binary mode when sending files to the Horizon imager, even when sending text files.*

6. Before sending a print job, send a Cancel command file to clear out any data from the previous sheet. (For more information about VMF command files, refer to "Creating VMF Command Files" on page 9-19.)

   ```
   ftp> put cancel.txt
   ```

7. Send the Canvas command to define the frame of the sheet, into which images will be placed. For example:

   ```
   ftp> put StandardCanvas.txt
   ```

8. Optionally, to include a fill area (for example, to create a frame around an image clip region), send a Fill command file.

9. For each image to be included in the sheet, send a Place command file, then immediately send the image file. For example:

```
ftp> put PlaceImage1.txt
ftp> put image1.tif
```

10. When you have sent all the images to be included in the sheet, send a Print command file.
11. Before sending another print job, send a Cancel command file to clear out any data from the previous sheet.
12. When you are finished sending print jobs and want to close the FTP session, enter **quit**.

Table 10-2 lists some other common operations that you may want to perform during an FTP session.

Table 10-2. Additional Common FTP Printing Operations for VMF Sheets

To:	Do This:
Cancel printing images already sent	Use the VMF Cancel command. For more information, refer to “Cancel Command File Contents” on page 9-16.
Change the Job Settings file being used	Enter the **cd** (change directory) command, followed by the VMF logical device number and the Job Settings file name. For example: `ftp> cd 10.MYSETTINGS3`

Sample FTP Sessions for VMF Sheets

In the following example sequence of commands, a user is printing 4 images on a sheet using a custom Job Settings file, then printing 2 images using a different custom Job Settings file:

```
% ftp 192.168.1.200
Name (192.168.1.200:username): john
Password: 10.MYJOBSETTINGS1
ftp> bin
ftp> put 4upcanvas.txt
ftp> put 4upposition1.txt
ftp> put image1.gif
ftp> put 4upposition2.txt
ftp> put image2.gif
ftp> put 4upposition3.txt
ftp> put image3.gif
ftp> put 4upposition4.txt
ftp> put image4.gif
ftp> put print.txt
ftp> cd 10.MYJOBSETTINGS2
ftp> put 2upcanvas.txt
ftp> put 2upposition1.txt
ftp> put image5.gif
ftp> put 2upposition2.txt
ftp> put image6.gif
ftp> quit
```

11

Sending Print Jobs Using LPR

LPR (named for *line printer*) is a printing tool that enables you to send files to the Horizon imager.

LPR utilizes the TCP/IP networking protocol and is most commonly used in UNIX and Linux, and to a lesser extent in MS-DOS/Windows and other platforms. Most LPR implementations have easy-to-use print commands for sending files to the imager. However, LPR typically requires configuration by a system administrator.

The LPR printing function is configured in different ways, depending on the operating system used. This chapter includes separate topics to explain how to configure and use LPR from some of these platforms.

LPR, Logical Devices, and Job Settings

When sending images to the Horizon imager using FTP or LPR, the imager uses numbers—referred to as *logical devices*—to determine what sheet format to use. Typically, the number represents the layout of the images on a sheet. For example, a 6-up sheet using a 2-column by 3-row image matrix would be designated by the logical device **23**. There are also other logical devices reserved for special uses, such as printing scaled or unscaled to 1-up sheets.

For a complete explanation of Horizon logical devices, refer to "Understanding Logical Devices" on page 9-2.

Optionally, you can specify a Job Settings file as part of the logical device. The Job Settings file contains one or more job, sheet, and image parameters to use for the print job. For more information on Job Settings files, refer to Chapter 8.

Using LPR with UNIX and Linux

Creating Horizon Imager LPR Printers Using /etc/printcap

As mentioned in the previous topic, the Horizon imager uses logical devices to determine the sheet format. Optionally, Job Settings files can be used to specify print job parameters. When using LPR, you need to configure a unique LPR printer for each logical device/Job Settings file combination that you anticipate using.

Some UNIX and Linux systems use the **/etc/printcap** method for defining LPR printers. Each LPR printer is defined in the LPR printer database file **/etc/printcap**. Therefore, for these systems, you need to create an entry in the **/etc/printcap** file for each Horizon logical device/Job Settings file combination.

Adding Horizon Imager Entries to /etc/printcap

A typical **/etc/printcap** entry for a Horizon imager has the following format:

```
name|alias
:lp=io:rp=fm:rm=ip:sd=spoolpathname:\
:lf=logpathname:mx=s
```

where:

name	is the unique name for the LPR printer. This will be the name used in the **lpr** command.
|	is a separator character between the LPR printer name and the alias name.
alias	is an alternate, unique name for the printer being defined.
:	is used to separate items in the printer entry

`lp=`*`io`*	defines the physical I/O port number, *io*. For a Horizon imager, this entry should always be **`lp=`** (that is, no values defined), since the Horizon imager is a remote device.
`rp=`*`ld`*	defines the logical device, *ld*, of the Horizon imager (for example, **`rp=23`** for a 6-up sheet). The logical device will also include the Job Settings file name if one is being used with this Horizon LPR printer (for example, **`rp=23.MYSETTINGS2`**).
`rm=`*`ip`*	defines the IP address or IP host name of the Horizon imager.
`sd=`*`spoolpathname`*	defines the pathname of the spool directory, where images to be printed are temporarily stored.
`lf=`*`logpathname`*	defines the pathname of the log directory.
`mx=`*`s`*	defines the maximum file size, *s*, for files to be printed. For a Horizon imager, this entry should always be **`mx=0`**, indicating that there is no maximum file size limit.
`\`	is used to indicate that the entry breaks over to another line in the file.

The following example shows Horizon imager entries in an **/etc/printcap** file (assuming the Horizon imager's IP address is 192.168.1.200; comment lines are preceded by #):

```
# My Horizon Printer
#
# For printing scaled images 1:1 using imager's
# Default User Settings.
#
hznscaled|scaleddefault:\
:lp=:rp=2:rm=192.168.1.200:sd=/usr/spool/hznscaled:\
:lf=/usr/adm/lpd-errs:mx=0:
#
# For printing scaled images 1:1 using the
# custom Job Settings file MYSETTINGS3.
#
hznscaledMJS3|scaledjs:\
:lp=:rp=2.MYSETTINGS3:rm=192.168.1.200:\
:sd=/usr/spool/hznscaledMJS3:lf=/usr/adm/lpd-errs:mx=0
:
#
# For printing bracketing images for contrast and gamma.
#
hznbracket|bracket:\
:lp=:rp=9:rm=192.168.1.200:sd=/usr/spool/hznbracket:\
:lf=/usr/adm/lpd-errs:mx=0:
#
# For printing images using VMF and the custom
# Job Settings file MYSETTINGS3.
#
hznvmfMJS3|VMF:\
:lp=:rp=10.MYSETTINGS3:rm=192.168.1.200:\
:sd=/usr/spool/hznvmfMJS3:lf=/usr/adm/lpd-errs:mx=0:
#
# For printing a 6-up sheet using FMF and the
# custom Job Settings file MYSETTINGS4.
#
hzn6upMJS4|6up:\
:lp=:rp=23.MYSETTINGS4:rm=192.168.1.200:\
:sd=/usr/spool/hzn6upMJS4:lf=/usr/adm/lpd-errs:mx=0:
#
# For printing a 12-up sheet using FMF and the
# custom Job Settings file MYSETTINGS4.
#
hzn12upMJS4|12up:\
:lp=:rp=34.MYSETTINGS4:rm=192.168.1.200:\
:sd=/usr/spool/hzn12upMJS4:lf=/usr/adm/lpd-errs:mx=0:
```

Creating the Spooling Directories

Once the Horizon logical devices/Job Settings printers have been added to the LPR printer database, the last step is to create the spooling directories. The spooling directories are specified by the **sd=** entries in the **/etc/printcap** file. You can create the directories in the appropriate locations using the **mkdir** command.

The previous example shows that all Horizon spool directories should be under the **/usr/spool** directory.

NOTE: *Make sure that the file system where the LPR spool directories will be located has enough space to accommodate the number and size of the image files that could be spooled at one time.*

Once you have found an area to put the spool directories, issue the following UNIX/Linux commands:

```
mkdir dir1 dir2 ...
chmod 755 dir1 dir2 ...
chown root dir1 dir2 ...
chgrp daemon dir1 dir2 ...
```

Where *dir1*, *dir2*, and so on are the names of the spool directories referenced in the **/etc/printcap** file.

NOTE: *The command's directory, owner, and group may change on different systems. Check the ownership of other spooling directories or contact your UNIX or Linux system administrator for help.*

Creating the Horizon Imager LPR Printers Using Administrative Utilities

Some UNIX-based systems—such as Sun Solaris, IBM AIX, and SGI IRIX—use administrative utilities instead of **/etc/printcap** for creating LPR interfaces to remote network output devices. Consult with your system administrator and system documentation for details about how to create an LPR interface.

The rules for Horizon logical devices and Job Settings files are the same if using an administrative utility as with the LPR **/etc/printcap** file, even though the method for defining an LPR printer may vary.

Using LPR to Print Sheets

To print jobs to the Horizon imager using LPR, you use the **lpr** command as follows:

```
lpr -Pname [-#c] [-s] imagefile1 [imagefile2] ...
```

where:

`-Pname`	specifies the name of the Horizon "imager" corresponding to the logical device/Job Settings file combination that you want to use.
`-#c`	is a command option that allows you to specify the number of copies, *c*, to print. If not defined, one sheet will be printed.
`-s`	is a command option that creates a symbolic link to the files to be printed instead of copying the file to the spool directory. This option can save printing time. If used, you cannot delete the image file being sent until it is finished printing.
imagefiles	are the image files to be printed on the sheet. Image cells are filled left to right, top to bottom.

Examples of Printing Single-Image or FMF Sheets

To print 3 copies of a single scaled image (called image.tif) using our previous setup examples—in which **hznscale** represents a 1-up scaled image sheet format using the imager's Default User Settings—you would enter:

```
lpr -Phznscale -#3 image.tif
```

To print 1 copy of 6 JPEG image files on a 6-up FMF sheet and using the Job Settings file called **MYSETTINGS4** (represented by the imager **hzn6upMJS4** in our setup examples) without spooling the image files, you would enter:

```
lpr -Phzn6upMJS4 -s image1.jpg image2.jpg ...
      image6.jpg
```

To print 1 copy of 11 JPEG image files on a 12-up FMF sheet, using the Job Settings file called **MYSETTINGS4** (represented by the LPR printer **hzn12upMJS4** in our setup examples) and an FMF Setup command file, you would enter the following **lpr** commands:

```
lpr -Phzn12upMJS4 FMFSetup2.txt
lpr -Phzn12upMJS4 image1.jpg image2.jpg ... image11.jpg
lpr -Phzn12upMJS4 Print.txt
```

The file **Print.txt** forces the sheet to print, since it is not full (if 12 images were sent, the sheet would print automatically when the twelfth image is received). For more information about the FMF Print command, refer to "Creating FMF Command Files" on page 9-12.

Examples of Printing VMF Sheets

To print 4 JPEG image files on a VMF sheet, using the Job Settings file called **MYSETTINGS3** (represented by the LPR printer **hznvmfMJS3**), you would enter the following **lpr** commands:

```
lpr -PhznvmfMJS3 4upcanvas.txt
lpr -PhznvmfMJS3 4upposition1.txt
lpr -PhznvmfMJS3 image1.jpg
lpr -PhznvmfMJS3 4upposition2.txt
lpr -PhznvmfMJS3 image2.jpg
lpr -PhznvmfMJS3 4upposition3.txt
lpr -PhznvmfMJS3 image3.jpg
lpr -PhznvmfMJS3 4upposition4.txt
lpr -PhznvmfMJS3 image4.jpg
lpr -PhznvmfMJS3 printsheet.txt
lpr -PhznvmfMJS3 cancel.txt
```

UNIX System V LP-Equivalent Commands

lpr is a UNIX BSD command. UNIX System V uses an **lp** command, which is similar. The following table shows some sample **lpr** commands and their equivalent **lp** version.

BSD lpr Version	System V lp Version	What It Does
`lpr -Phznscaled file`	`lp -dhznscaled file`	Print 1-up scaled
`lpr -Phznscaled -#5 file`	`lp -dhznscaled -n5 file`	Print 5 copies

Setting Up Horizon Imager Configuration with lpadmin

You can use the **lpadmin** command to set up the print configuration for subsequent LP printing to a Horizon imager.

The structure of the **lpadmin** command to set up a Horizon imager configuration is:

```
lpadmin -s horizonhostname!horizonld[.jobsettings]
   [-p printername]
```

where:

horizonhostname is the Horizon imager's IP host name, as stored in the local **/etc/hosts** file, or its IP address.

horizonld is the Horizon logical device number that corresponds to the sheet format to use (treated internally to the LP function as the printer's queue name).

NOTE: *The exclamation mark (!)* ***must*** *be between the Horizon host name (or IP address) and the logical device number. Also, some Solaris systems may require that a backslash (\) precede the exclamation mark.*

jobsettings (optional) is the name of the Job Settings file to use for the print job.

printername (optional) is the LP printer name for this configuration of the imager. If this name is not specified, then the setup is the default configuration for the imager.

Example 1

To set up the default configuration for the Horizon imager to print scaled images (which use Horizon logical device 2), you would enter the following command:

```
lpadmin -s horizon!2
```

To print to the imager using the default configuration, you would enter:

```
lp -d horizon imagefile
```

Example 2

To create a printer for printing PostScript files (which use Horizon logical device 7) on the imager, you would enter the following command:

```
lpadmin -s horizon!7 -p horizon_PS
```

To print a PostScript file to the imager using this configuration, you would enter:

```
lp -d horizon_PS postscriptfile
```

Example 3

To create a printer for printing unscaled images (which use Horizon logical device 1) to **ChromaVista** A-size paper/white film on the imager, you would enter the following command and include the corresponding system Job Settings file:

```
lpadmin -s horizon!1.a-cvp -p horizon_color_A
```

To print to the imager using this configuration, you would enter:

```
lp -d horizon_color_A imagefile
```

Using LPR with Windows

The Windows LPR command (supported in Windows NT, 2000, and XP) permits printing without an explicit setup for the imager. To send images to the imager, the **lpr** command has the following format:

```
lpr [-h] [-0l] -x -S ip -P ld imagefile1 imagefile2 ...
```

where:

`-h`	specifies to suppress the header.
`-0l`	(lower case L) specifies binary transfer mode.
`-x`	specifies Sun OS compatibility mode.
`-S` *ip*	specifies the Horizon imager's IP address or host name.
`-P` *ld*	specifies the logical device/Job Settings file combination to use (for example, **23.MYSETTINGS3**).
imagefiles	are the image files to be printed on the sheet. Image cells are filled left to right, top to bottom.

For example, to print 6 JPEG image files on a 6-up FMF sheet, using the Job Settings file called **MYSETTINGS3**, you would enter the following command:

```
C:\> lpr -h -0l -x -S 192.168.1.200 -P 23.MYSETTINGS3
     image1.jpg image2.jpg ... image6.jpg
```

12

Printing from Backup Media

The Horizon imager supports printing images from backup media. This chapter explains how to set up the image files on the backup media, and how to print them.

Setting Up Images on Backup Media

Creating Image File Print Sets

You organize image files into print sets according to the sheet formatting and print job settings to use for the images. All files of the set must be stored in the same directory, with one directory for each print set.

The print set includes:

- The image files. They can be in any of the supported image file formats, including PostScript.
- A file called **device.txt** that includes a Horizon logical device number as its only content. The logical device number specifies the sheet formatting to use. Supported logical devices are 1 (unscaled single image), 2 (scaled single image), 7 (PostScript), 11 to 99 [Fixed Multiformatting (FMF)], 100 to 104 (captions), and 135 (35mm SlideMaker).For more information about logical devices, refer to “Understanding Logical Devices” on page 9-2.

If no **device.txt** file is in the directory, images will print one to a sheet and be scaled to fill the imageable area of the sheet. (This corresponds to logical device 2.)

- Optionally, a file called **settings.txt** that contains entries defining print job parameters. Any print job parameters not defined for the set (that is, the parameters are not defined in the **settings.txt** or no file is present) will use the parameter settings defined in the Default Media and Default User Settings menu at the control panel. The format of the **settings.txt** is the same as for Job Settings files.

  For information about the print job parameters, refer to Chapter 6. For information about how to make parameter entries in the **settings.txt** file, refer to Chapter 8, which covers Job Settings files.

Note that a **device.txt** or **settings.txt** file applies only to the images in the directory (that is, the print set) in which the images are located.

Backup Media File System Structure Requirements

The backup media file system must be set up as follows:

- The backup media must be formatted with Windows FAT file system.
- All print set directories must be at the first level below the root directory.
- The root directory can be used to store one of the image file print sets.

How Images Are Processed for Printing

The imager processes the images on the backup media as follows:

- All images in the root directory or in any first-level subdirectories on the backup media will be printed (interactive selection of which images on the backup media to print is not supported).
- Images and directories with the following naming characteristics will be ignored:
  - Images or directories starting with a period (.)
  - Directories with the names **logs** or **configs**
  - Known nonimage files such as *.exe, *.com, and *.bat files
  - Horizon log and software installation files

  The imager assumes that all other files, other than **device.txt** and **settings.txt**, are image files and attempts to process them. Only files in supported image formats will actually be processed and queued for printing.
- Directories and image files are processed in alphanumeric order. Therefore, the image placement order on the sheet can be controlled by using prefixes to the image files such as “1, 2, 3, ...” or “a, b, c, ...”.
- As many sheets as necessary will be printed to print all images in the root and first-level directories. Partial FMF sheets will be printed with the remaining image cells blank when the last image in a print set has been read and added to a sheet. (For more information about FMF, refer to Chapter 9.)
- The number of copies specified at the control panel applies to each sheet being printed. Multiple copies of the same sheet are printed together (that is, sheets are not collated).

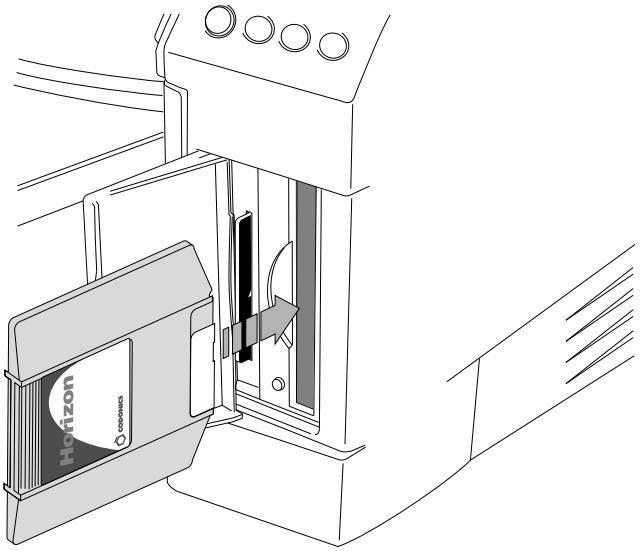
Printing Images on Backup Media

To print images stored on backup media

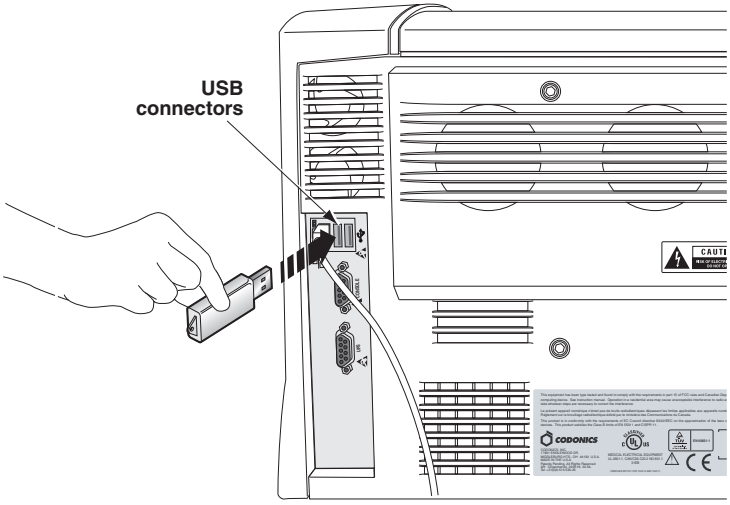
1. Insert the backup media.

   If your Horizon has a Zip drive:

   - Open the Smart Card panel door at the lower right front of the imager.
   - Insert the 100-MB Zip disk into the Zip drive, with the label side to the right, until it “clicks” into place.



If your Horizon does not have a Zip drive, insert a USB flash drive into one of the USB ports on the rear panel of the imager.



2. At the imager's control panel, press and hold the ◀ key, and while holding it press the MENU key.

   The Main Menu with administrative options displays.

3. Select the **Print From USB Drive** menu option.

   The Print From USB Drive screen displays.

Menu
Print From USB Drive **Copies** [1]
Select number of copies to print (1 to 100) ENTER to submit job, CANCEL to abort.
Press MENU to exit menus

4. Specify the number of copies of each sheet to print, then press the ENTER key.

The images stored on the backup media are queued for printing.

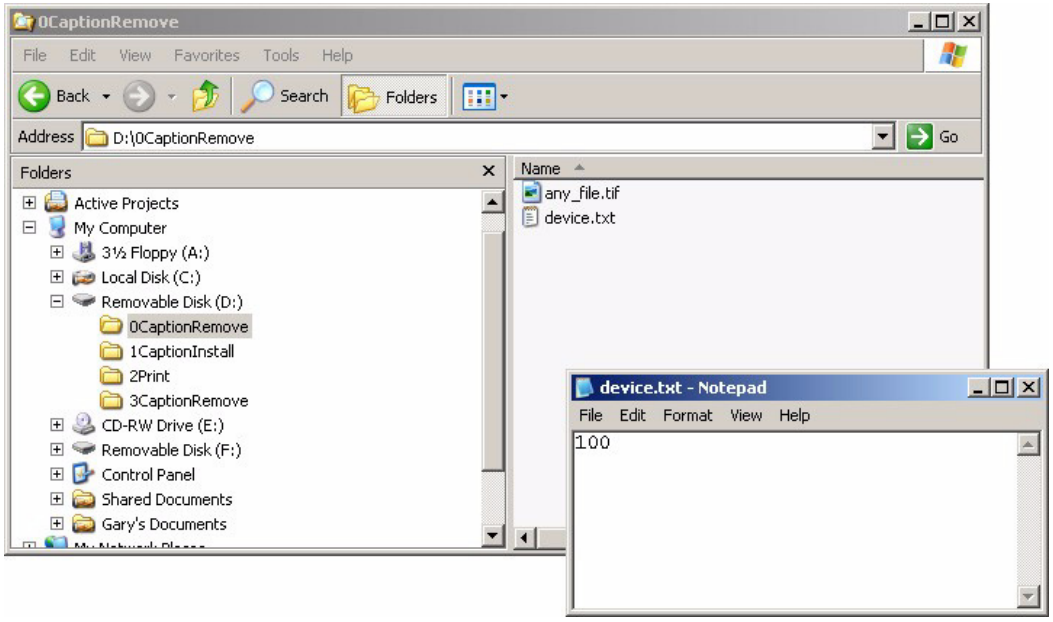
5. *If using a USB flash drive as backup media,* disconnect the USB flash drive when all images have been printed.

   If using a Zip disk as backup media, the Zip disk is ejected automatically when all images have been printed.

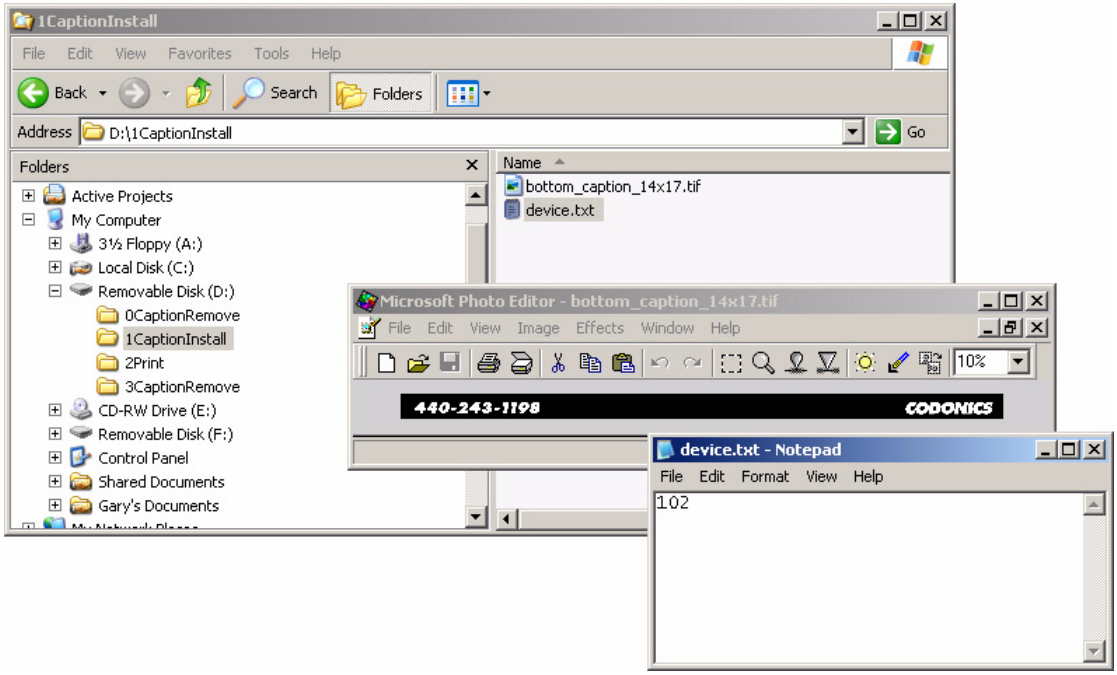
Backup Media Printing Example

The following figures show a sample print set from backup media. The folders are processed in alphabetic order, so the set:

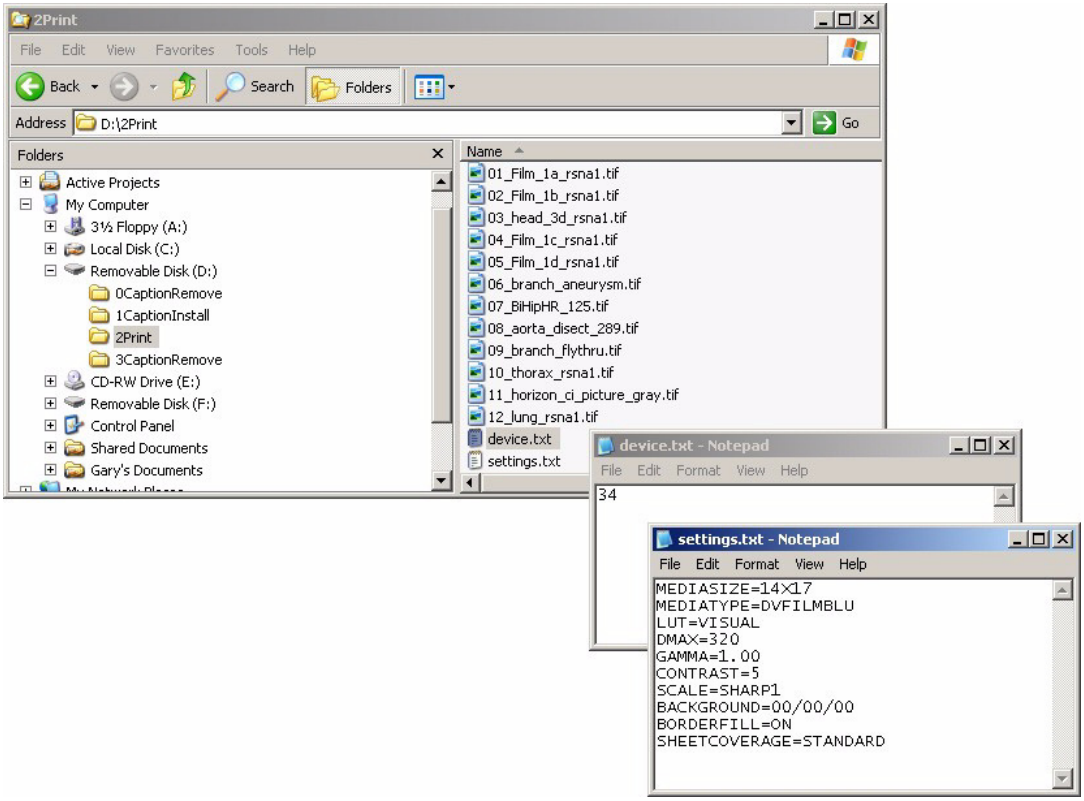
1. Removes any captions.
2. Installs a bottom caption.
3. Prints a 12-up sheet according to settings in the **settings.txt** file.
4. Removes the caption installed in step 2.



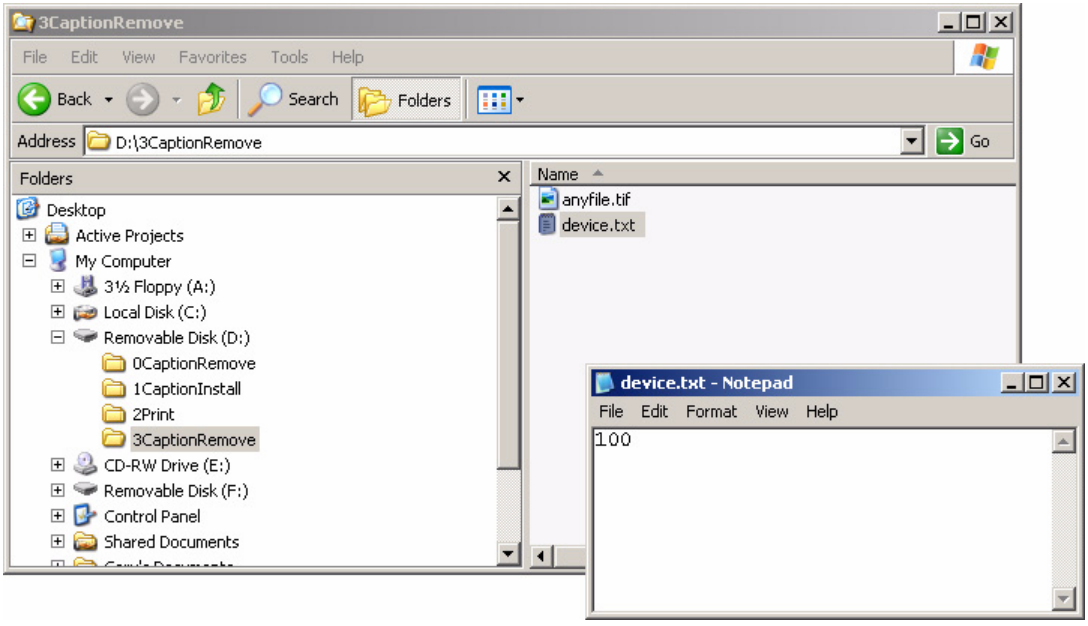
Files in 0CaptionRemove folder remove any captions currently installed



Files in 1CaptionInstall folder install bottom caption



Files in 2Print folder print 12-up sheet



Files in 3CaptionRemove folder remove the bottom caption

13

Installing and Maintaining Captions

For FTP and LPR printing, the Horizon imager allows you to place up to four captions around a single sheet (for example, the site name or date, which would have to be changed every day). There are five Horizon caption logical devices, one each for specifying the four caption positions—top (101), bottom (102), left (103), and right (104) sheet edges—and one (100) for deleting the currently stored caption files. Captions can be in any of the image formats supported by the Horizon imager except PostScript.

To install and use a caption, you:

1. **Send the caption image file to the imager.** Using FTP or LPR, you send the caption image file to the Horizon caption logical devices—101 through 104—that corresponds to the desired sheet edge location.
2. **Turn captions on for print jobs.** You can turn captions on by setting the sheet parameter Caption to ON for the Default User Settings at the control panel, in a custom Job Settings file, or in a User Settings file.

When captions are stored on the imager and turned on, they are added to images at the appropriate locations. Captions are ignored if you turn them off. You can delete all stored captions by sending any file to logical device 100.

How Captions Are Added to Sheets

Caption Placement

Before an image is converted and printed, the imager's hard disk is searched for caption images. If any are found and the Captions function is turned on (refer to "Turning Captions On and Off" on page 13-8), they are added to the sheet at the appropriate location. Then, the remaining area is considered the imageable area in which the image can be placed. This ensures that the caption does not overlap the image.

The orientation is assumed to be from the perspective of the ***physical page*** and not the image being printed. In other words, the top of a ***physical page*** is always the physical top edge of the paper/white film in portrait orientation, and not the top of the image being printed.

Color captions are automatically converted to grayscale if printing to **DirectVista** grayscale media.

Unscaled Single-Image Sheets

If an image is sent to logical device 1 (unscaled single-image sheets), each caption (if any) is added to the image prior to processing. The resulting combined image is handled as if it were received as a single image from the host. This is important to consider because:

- The size of the printed image includes the original image and any captions, possibly affecting whether the combined image will fit in its imageable area or be cropped.
- The same image settings (gamma, contrast, and so on) being applied to the original image will also be applied to the captions.

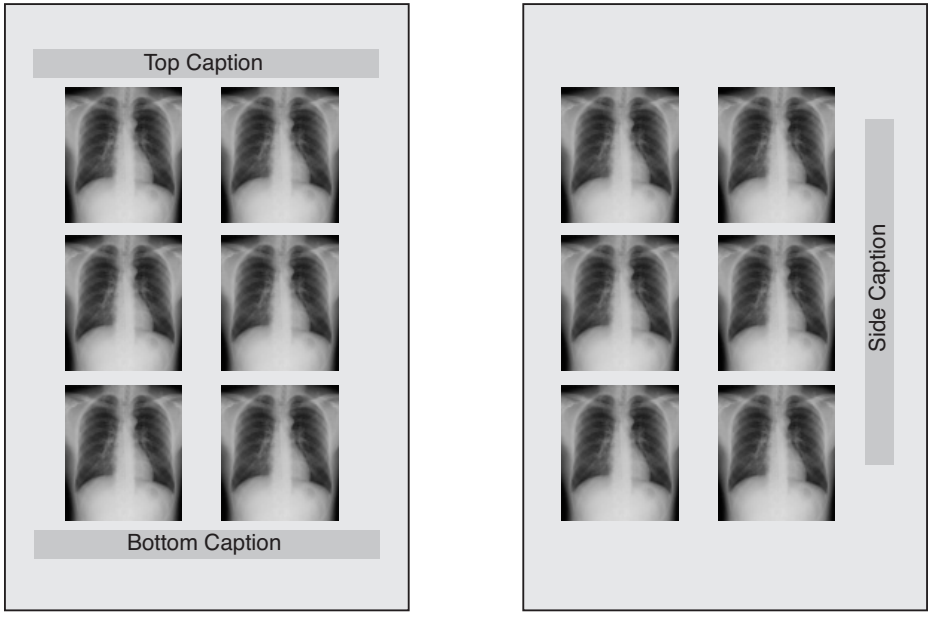
Scaled Single-Image Sheets

If an image is sent to logical device 2 (scaled single-image sheet), the same image settings (gamma, contrast, and so on) being applied to the image will also be applied to the captions.

Considerations When Using Captions

Captions can be in any of the image formats supported by the Horizon imager except PostScript.

An image used as a caption should be appropriately sized and oriented to have the least amount of impact on space the original image. Figure 13-1 shows appropriate placement of captions around an image.

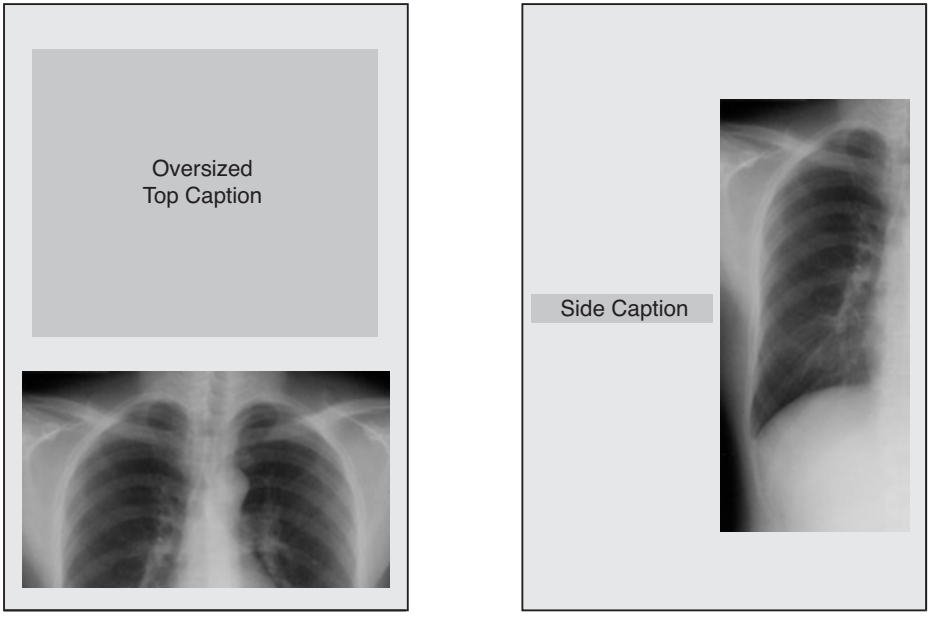


Scaled images with top and bottom captions properly sized

Scaled images with side caption properly rotated and sized

Figure 13-1. Appropriately Sized and Oriented Captions

The imager does not rotate captions. So, if you are using a landscape-oriented caption that is to be placed on the side of an image, you have to rotate the caption in a graphics application before sending it to the imager. Also, if a large caption is being placed at the top or bottom of a sheet, a portion of an unscaled image may be pushed out of the imageable area to accommodate the caption. For examples of these, refer to Figure 13-2.



Unscaled image is pushed down to make room for a large top caption

Unscaled image with a wide left caption

Figure 13-2. Inappropriately Sized and Oriented Captions

As a general rule, top and bottom captions must be as short as possible, while left and right captions must be as narrow as possible.

Storing and Removing Captions

You store captions in the imager by sending an image file of the caption using FTP or LPR. You use logical devices reserved for captions, listed in the following table, to indicate that you are sending caption images to the imager.

Table 13-1. Logical Devices Used for Captions

Logical Device	Caption Function
100	Remove all captions
101	Top caption
102	Bottom caption
103	Left caption
104	Right caption

You cannot specify Job Settings files with any of the caption logical devices.

Storing Captions Using FTP

To store captions in the imager using FTP, you would run an FTP session as described in Chapter 10, with the following exceptions:

- Use the logical device corresponding to the position of the caption as the FTP login password (you can use any name for the FTP login user name). This tells the Horizon imager that the FTP session will be sending a caption image, and where to place that image relative to an image.
- Use the FTP **put** command to send the caption image file.

To replace a caption stored on the imager, simply send another caption image file, using the appropriate logical device as the FTP login password.

FTP Example

The following example sequence of commands shows how a right side caption can be stored on the imager using FTP:

```
% ftp 192.168.1.200
Name: john
Password: 104
230 User john logged in on Right Caption Device.
ftp> bin
ftp> put rightcaption.tif
ftp> quit
```

For more information about using FTP with the Horizon imager, refer to Chapter 10.

NOTE: *You must use binary mode when sending files to the Horizon imager, even when sending text files.*

TIP: Ensuring you are using the correct logical device
When entering a password at the FTP login, the characters are not echoed back to the screen. To ensure that you are using the correct logical device, you can respecify it by entering the ***cd*** *(change directory) command with the logical device as the command's argument. For example:*

```
ftp> cd 104
```

Storing Captions Using LPR

To store captions in the imager using LPR, you need to set up the five caption-related Horizon logical devices (refer to Table 13-1 on page 13-5) as LPR printers. For more information about how to do this, refer to Chapter 11.

Then, to store the caption image file on the imager, you use the **lpr** command to print the caption's image file to the LPR printer that includes the appropriate caption logical device in its printer definition.

To replace a caption stored on the imager, simply use the **lpr** command to print another caption image file to the appropriate "caption" LPR printer.

LPR Example

The following example shows how to use the **lpr** command to send two captions, assuming that the printer definitions for the LPR printers **hzntopcap** (top caption) and **hznbottomcap** (bottom caption) include the appropriate caption logical devices:

```
lpr -Phzntopcap caption_top.tif
lpr -Phznbottomcap caption_bottom.tif
```

Removing All Captions from the Imager

To remove all captions from the imager, you would use the same procedure as storing the caption files described previously for FTP and LPR, except you would:

- Use the caption-related logical device **100**.
- Send any file to the imager (for example, a text file that has only a space character in it). The contents of the file are ignored by the imager. The receipt of the file alone indicates to the imager to delete all stored caption files.

FTP Example

The following example sequence of commands shows how to remove all captions from the imager using FTP:

```
% ftp 192.168.1.200
Name: john
Password: 100
ftp> bin
ftp> put anyfile.tif
ftp> quit
```

NOTE: *You must use binary mode when sending files to the Horizon imager, even when sending text files.*

TIP: Ensuring you are using the correct logical device

When entering a password at the FTP login, the characters are not echoed back to the screen. To ensure that you are using the correct logical device, you can respecify it by entering the ***cd*** *(change directory) command with the logical device as the command's argument. For example:*

```
ftp> cd 100
```

LPR Example

The following example shows how to remove all captions from the imager using the **lpr** command, assuming that printer definition for the LPR printer **hzndeletecap** includes logical device 100:

```
lpr -Phzndeletecap anyfile.txt
```

Turning Captions On and Off

You can turn captions on and off using the Captions sheet parameter:

- To turn captions on and off in the User Default Settings menu at the control panel, refer to the *Horizon Imager User Manual*.
- To turn captions on and off using User Settings or custom Job Settings files, refer to Chapters 7 and 8, respectively.

14

FTP and LPR Bracketing Sheet Printing

Horizon Bracketing enables you to print multiple versions of the same image on a test sheet using different image parameter values for each version. You can then view these images, determine which one looks best, and use the corresponding image parameter values when printing images.

The Horizon imager allows you to print a gamma/contrast bracketing sheet and—for **ChromaVista** color paper/white film—a gamma/saturation bracketing sheet. The bracketed images are printed using different gamma, contrast, and saturation values. The imager also allows you to print a Medical Color Matching (MCM) bracketing sheet, for matching printed images to a monitor.

This chapter explains how to print a bracketing sheet using FTP and LPR. For instructions on how to print a bracketing sheet using DICOM or PostScript, and how to analyze the bracketing sheet to determine the parameter values that produce the desired image appearance, refer to the *Horizon Imager User's Manual*.

NOTE: *When sending an image for printing on a bracketing sheet, you can use all of the standard methods for defining the print job parameters, such as Job Settings files, the User Default Settings menu at the control panel, and so on.*

Printing the Bracketing Sheet—FTP

To print bracketing sheets using FTP, you would conduct the FTP session as described in Chapter 10, with the following exceptions:

- Use the appropriate logical device number (**9** for gamma/contrast/saturation bracketing sheets, **8** for an MCM bracketing sheet), and, optionally, a Job Settings file name as the FTP password. This tells the Horizon imager that the FTP session will be sending a bracketing image. (You can use any name as the FTP user login name, unless you want to use a User Settings file with the bracketing sheet.)
- Use the FTP **put** command to send the image to be used on the bracketing sheet.

After executing the **put** command, the imager prints a bracketing sheet. If the printing parameters specify **ChromaVista** color as the media type and you specified logical device 9, a gamma/saturation bracketing sheet is also printed.

Printing the Bracketing Sheet—LPR

To print bracketing sheets using LPR, you need to create an LPR printer whose definition includes logical device **9** (for gamma/contrast/saturation bracketing sheets) or logical device **8** (for MCM bracketing sheets). For more information about how to do this, refer to Chapter 11.

Then, to send the image to be used on the bracketing sheet, use the **lpr** command to print the image file to that printer.

After executing the **lpr** command, the image prints the bracketing sheet. If the printing parameters specify **ChromaVista** color as the media type and the printer's definition specified logical device 9, a gamma/saturation bracketing sheet is also printed.

The following example shows how to print a bracketing image using the **lpr** command, assuming that the printer definition of the LPR printer **hznbracket**: includes logical device 9.

```
lpr -Phznbracket bracket_image.tif
```

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Enabling Imager Features

Depending on which optional features have been purchased for your imager, you can choose to purchase and enable additional features. For information on purchasing additional features, contact your Codonics representative.

The imager ships with some features installed on a temporary basis, so that you can try the features. These temporary features expire after a predefined period of time.

You enable a feature in the imager by entering the appropriate feature key, which is provided by Codonics when you purchase the feature. You can also view a listing of the currently enabled features.

NOTE: *A warning message is displayed on the control panel when temporary DICOM keys are within ten days of expiration or have expired.*

To add a feature key

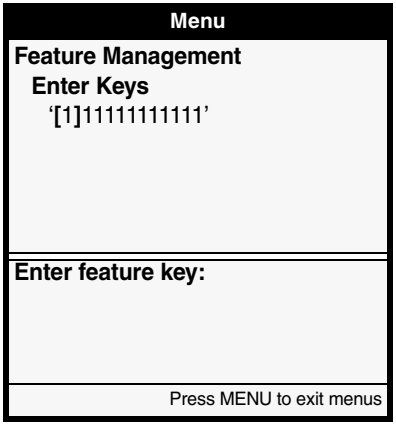
1. At the imager's control panel, press and hold the ◀ key, and while holding it press the MENU key.

   The Main Menu with administrative options displays.

2. Select the following menu options:

   Feature Management
   Enter Keys

   The Enter Keys menu displays.



3. Enter the key value for the feature that you want to enable.
4. When you are done entering the key value, press the ENTER key to save the key entry.

   Continue entering other feature keys. When you exit the control panel menus, the imager reboots automatically to fully enable the features.

To view the currently enabled features

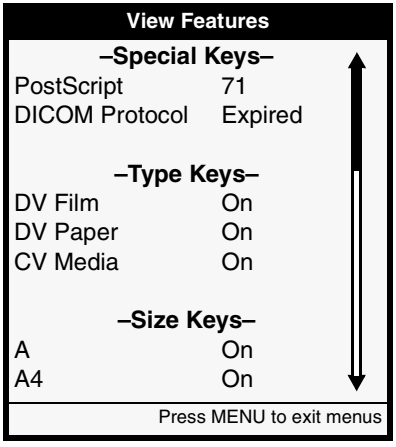
1. At the imager's control panel, press and hold the ◀ key, and while holding it press the MENU key.

   The Main Menu with administrative options displays.

2. Select the following menu options:

   Feature Management
   View Features

   The View Features screen displays.



Features are labeled as follows:

- **Purchased** features are labeled as being "On."
- **Temporary** features (for example, PostScript support in the sample screen above) show the number of days left before the feature expires.
- When temporary features are **expired**, they are labeled as being "Expired" (for example, DICOM support in the sample screen above).

16

Updating Software

The Horizon imager provides for easy software updates. The type of installation media used to perform software updates depends on the imager hardware. If the imager has a Zip drive, installations are performed using DOS-formatted 100-MB Zip disks. If the imager has no Zip drive, then USB flash drives are used. Installation media is labeled for easy identification, including the type and version of the software. The imager will be ready to use immediately after the update is complete.

NOTE: *The Horizon imager is shipped with software already installed. Use this procedure only when installing updates or when instructed to by an authorized Codonics representative.*

NOTE: *If the imager has both a ZIP drive and a USB port, always use the ZIP disk to install software.*

The imager must be set up and connected to power before loading software. Refer to the *Horizon Imager User's Manual* for more information on how to unpack and set up the imager.

NOTE: *The software installation process takes 15 to 20 minutes. During this time, the imager will not be available for printing. Please schedule software updates accordingly.*

To install a software update

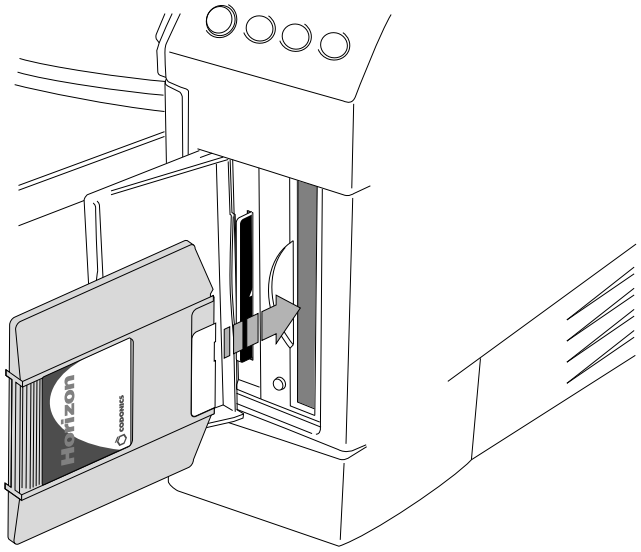
1. If the imager is on, press the ⏻ (power) key at the control panel to power it off.
2. Open the Smart Card panel door at the lower right front of the imager.

3. Make sure that the Smart Card is inserted.

NOTE: *The Smart Card must be inserted during the software installation process. Information on the Smart Card is not affected by the installation process.*

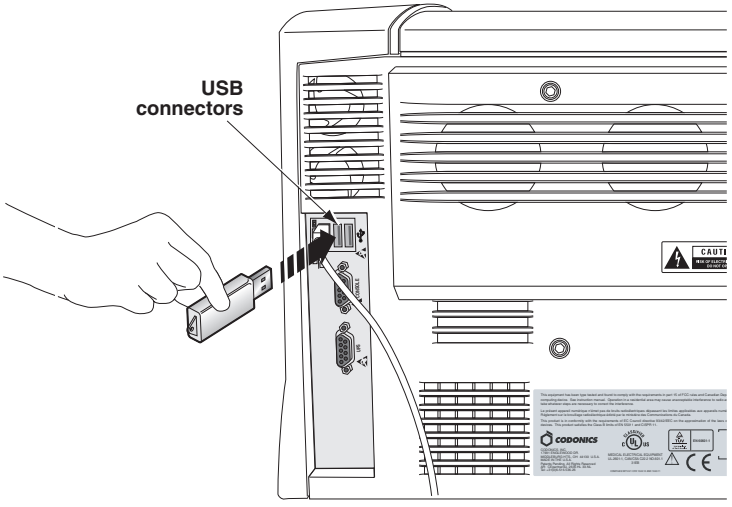
4. *Insert the installation media.*

   If your Horizon has a Zip drive, insert the 100-MB Zip disk into the Zip drive, with the label side to the right, until it "clicks" into place.



NOTE: *Leave the panel door open while the Zip disk is in the drive.*

If your Horizon does not have a Zip drive, insert a USB flash drive into one of the USB ports on the rear panel of the imager.



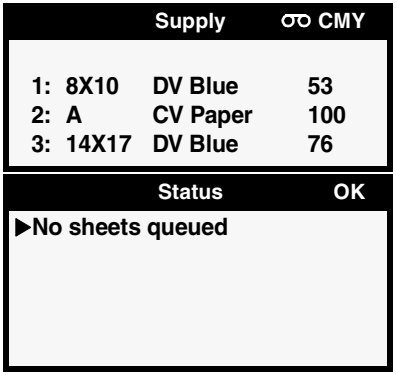
5. Press the ⏻ (power) key at the control panel to power the imager on.

   The imager automatically boots and installs the software update. When complete, the imager reboots.

CAUTION Do not power off the imager during the software installation process.

6. Remove the installation media.
7. Close the Smart Card panel door.
8. Save the installation media for future use.

When the imager has finished restarting, the control panel displays a Status screen similar to the following:



The software update is now complete and the imager is ready for use.

17

Horizon Smart Card

The Horizon Smart Card is a built-in storage device that holds up to 32 KB of critical imager information, including feature keys and configuration data.

CAUTION The Smart Card must be inserted for the imager to operate. If the Smart Card is not inserted, the imager can boot up but will not be able to print jobs. A message at the control panel screen will prompt you to insert the Smart Card.

The Smart Card also allows you to move an imager's feature keys and configuration files to another imager, thus allowing the second imager to operate exactly like the first. This feature is especially helpful when swapping imagers for service purposes.

Note that a Smart Card cannot be duplicated. That is, it cannot be used in two imagers at the same time.

Information Stored on the Smart Card

The Horizon Smart Card is the main storage device for the following:

- **Horizon Software License Code.** This is the serial number for the Horizon software. All keyed features are keyed off of the License Code.
- **Feature Keys.** Keys for each purchased imager feature.
- **Imager Configuration.** This includes network settings, imager preference settings, Default Media settings, Default User Settings, Job Settings files, and logging settings. It does not include caption files or User Settings files.

Events That Update the Smart Card

The following events trigger an update of the data stored in the Smart Card:

- User-initiated power downs
- User-initiated reboot
- Reboot that occurs after a change to network settings
- Entry of a feature key
- Automatically every 24 hours

Using Smart Card vs. Backup Media

Table 17-1 discusses various applications that include copying imager information and which is the ideal medium—Smart Card or backup media—to use.

Table 17-1. Using Smart Card or Backup Media for Copying Applications

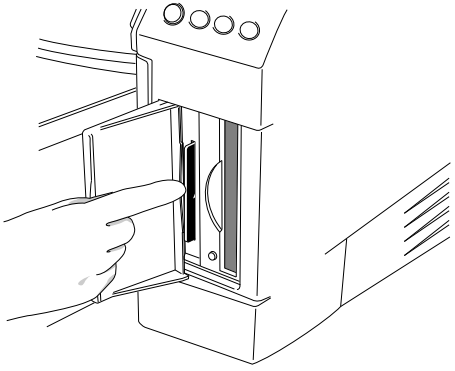
Application		Smart Card
Duplicate an imager's configuration on another imager.	Use backup media.	Cannot use Smart Card because it cannot be duplicated.
Backing up and restoring configuration information	Use backup media	Cannot use Smart Card. Smart Card stores only the current settings. Also, it cannot be removed to operate another imager without disabling the current imager.
Duplicate feature keys—cannot be done.	Cannot use backup media because feature key information cannot be copied to it.	Cannot use Smart Card because it cannot be duplicated.
Move configuration information and feature keys to another imager (for example, a swap imager).	Cannot use backup media for this because feature key information cannot be copied to it.	Use Smart Card.
Distribution of default settings and Job Settings files to multiple imagers (for example, by an OEM or dealer/distributor).	Use backup media for distributing these settings to multiple imagers.	Cannot use Smart Cards because they cannot be duplicated.

Smart Card and Swap Imager

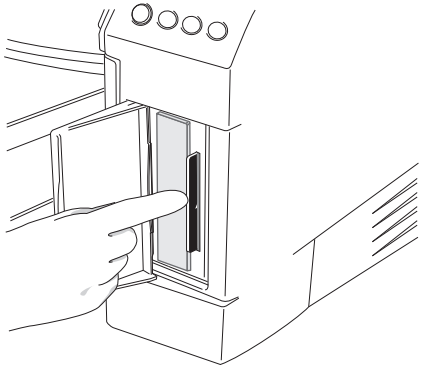
When swapping imagers for service reasons, the swap imager does not come with a Smart Card. You have to move the imager's Smart Card, with all its unique information—that is, its license code, configuration data, and so on—to the swap Horizon imager.

To move the Smart Card to a swap imager

1. Power off both imagers.
2. Remove the Smart Card, then insert it into the new imager.



Smart Card in slot—Horizon with Zip drive



Smart Card in slot—Horizon with no Zip drive

3. Power on the new imager.

If the Smart Card is ever reinserted back into the original imager, the Smart Card and, thus, the original imager, will have any changes made on the Smart Card while in the swap imager.

18

Log Files and Status Information

The Horizon imager maintains log files and status information to assist you and Codonics in determining the state of the imager and for troubleshooting problems. This chapter explains how to view some of the log and status information.

For standard troubleshooting information, refer to the *Horizon Imager User's Manual*.

Log Files

Imager activity, including errors, are recorded in log files.

You can view the most recent error log entries at the imager control panel using the Error Log menu option. You can also copy the imager's log files to backup media so that they can be sent to a Codonics representative to assist in troubleshooting problems.

The following topics discuss how to perform these tasks.

NOTE: *The System Log Level utility is not currently implemented.*

Viewing Error Log Entries at the Control Panel

You can view the most recent 100 error entries in the main log file using the Error Log utility at the control panel.

To view error log entries

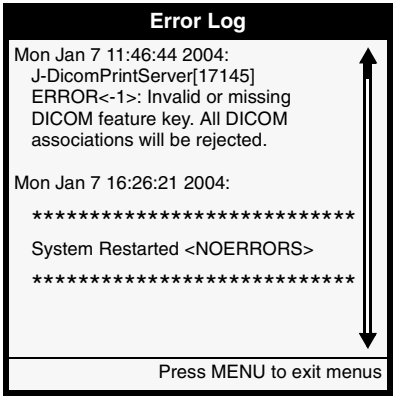
1. At the imager's control panel, press and hold the ◀ key, and while holding it press the MENU key.

   The Main Menu with administrative options displays.

2. Select the following menu options:

   Utilities
   Error Log...

   The Error Log screen is displayed.



3. Use the ▲ and ▼ keys to scroll through the list of entries.
4. To dismiss the Error Log screen and return to the Utilities menu, press the CANCEL key.

Copying Log Files to Backup Media

If you experience problems, the Horizon imager includes a utility that allows you to copy the log files to backup media so that you can send them to a Codonics representative to troubleshoot the problem. The type of backup media you use depends on the imager hardware.

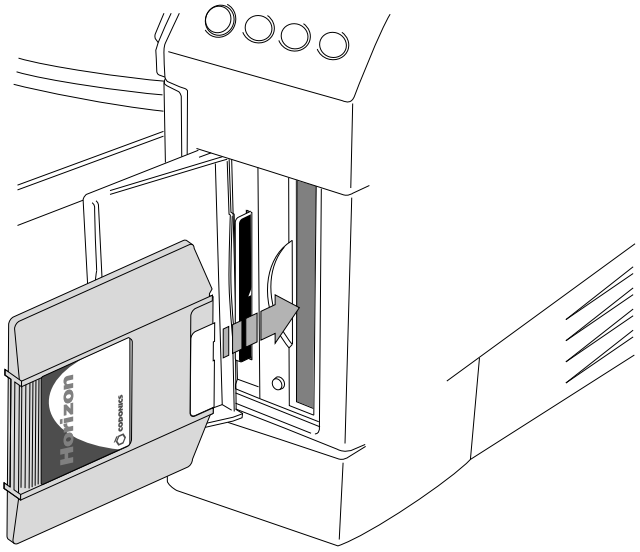
NOTE: *You will typically copy log files to backup media only at the request of a service or support representative.*

To copy the log files to backup media

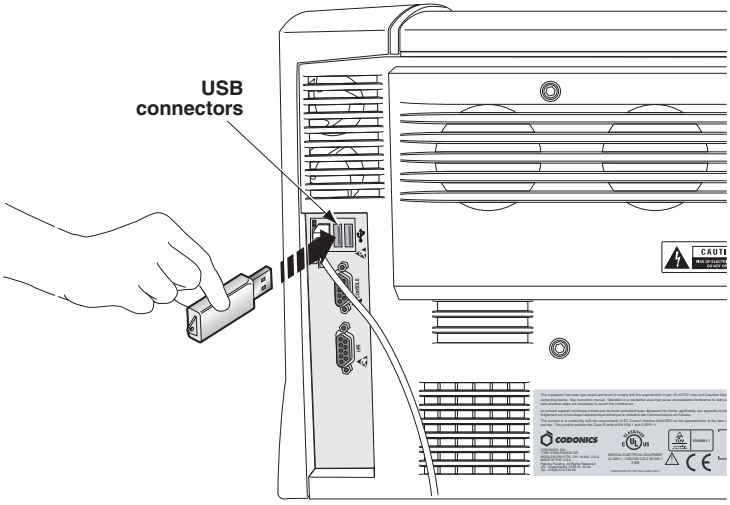
1. Insert the backup media.

   If your Horizon has a Zip drive:

   - Open the Smart Card panel door at the lower right front of the imager.
   - Insert a 100-MB Zip disk into the Zip drive, with the label side to the right, until it “clicks” into place.



If your Horizon does not have a Zip drive, insert a USB flash drive into one of the USB ports on the rear panel of the imager.



2. At the imager's control panel, press and hold the ◀ key, and while holding it press the MENU key.

   The Main Menu with administrative options displays.

3. Select the following menu options:

   Utilities
   Save Log Files

   A message prompts you to confirm that you want to save the log files to backup media.

4. Press the ENTER key to confirm the copy operation.

   The log files are compressed into a PKZIP file, which is copied from the imager to the backup media.

Viewing Status and Logs Using Telnet

You can open a Telnet connection to monitor imager activities over a TCP/IP network, including:

- Status
- Imager configuration
- Media
- Ribbon type (**ChromaVista** color only)
- Print queues
- Progress messages

You can also use a Telnet session to display certain log files.

The following topics discuss how to perform these tasks.

Special Imager Telnet Logins

There are several Telnet user logins supported by the Horizon imager:

- **status** (no password). Displays the imager's current status information.
- **log** (no password). Displays the continual output of the imager's main log file.
- **mediacount** (no password). Displays the imager's count of successful prints for each type and size media combination. Does not include prints that did not successfully complete (for example, due to jammed media).
- **service** (default password: **codonics!**). Displays a session command line, allowing access to service utilities.

CAUTION While logged in as **service**, if you attempt to use any commands other than those documented in this manual, you could cause problems with the imager that would not be supported by Codonics.

NOTE: *For security reasons, you should change the* ***service*** *login's default password as soon as possible. This can be done using the standard UNIX administration tools, available on the imager.*

You can use any Telnet application on your workstation to open a Telnet session with the Horizon imager.

Once you have successfully started a Telnet connection, specifying imager's IP address, the Horizon imager's login prompt will be displayed. Use the appropriate Horizon imager login, as explained in the following topics.

Viewing Current Status Information

You can access the imager's current status information in two ways:

- Logging in to the Telnet session as **status**. After logging in, the status information is displayed. The default settings that are displayed are the Default User Settings set at the control panel. To exit the status listing and log out of the session, press the Enter key at your workstation.
- Logging in to the Telnet session as **service**. After logging in, enter the **stat** command to display the status information. To display a custom User Settings file information, include the user login name as an argument to the **stat** command. For example:

  ```
  % stat leah
  ```

NOTE: *For a custom User Settings file listing, undefined parameters are indicated by an asterisk.*

For a custom User Settings file listing, undefined parameters are indicated by an asterisk.

Sample Status Listing

Following is a sample status listing.

```
PrinterSuperState: Fault
Now: Jul 22, 2003 11:55:31 AM, EDT

MediaSupplyInfo:
 SupplySlot 1: No cassette unknown       [not present] [not enabled] [0]
 SupplySlot 2: No cassette unknown       [not present] [not enabled] [0]
 SupplySlot 3: No cassette unknown       [not present] [not enabled] [0]
 Ribbon:    WAIT [not present] [not enabled] [not empty]    [no error]

OperatorInfoList:
 CS_OUT_OF_MEDIA (5002) [12] [1] Out of media.
 PR_OFFLINE (1100) [14] [0] Printing paused.
 PQ_NO_SHEETS_QUEUED (1500) [19] [0] No sheets queued.

SW version: v1.7.0
Created: 11:53 Jun 30, 2003
root.horizon (i686 Linux 2.2.5-15)

EngineInfo:
 Firmware Version: 1.7.0
 Firmware Build Information: v1.7.0 11:05 06/30/03
 Imager Serial Number: 50C00211C
 Control FPGA Version: 32
 Engine FPGA Version: 34
 Sensor FPGA Version: 16
 Engine Subassembly ID: 0
 Motherboard Serial Number: IN023302073
```

```
 TPH Serial Number: 2E139104
 TPH Scan Profile Version: 1
 Side Edge Calibration Version: 5
 Software License Code: 001-00336-184
 KDU Serial Number: S0000
 KDU Version: S5.09U5.15H02
 Product Code: 1

PrintParamsInfo:
Defaults: User (mysettings) <* = inherited from root>
              DVFILMBLU  DVFILMCLR  DVPAPER    CVPAPER
 ------------------------------------------------------------
 Saturation    --         --         --         20
 Gamma        *1.00      *1.00      *1.00       1.10
 Contrast     *0         *0         *0          -5
 Rotate       *Auto      *Auto      *Auto      *Auto
 Scale         Sharp1     Sharp1     Sharp1     Sharp1
 MCM           --         --         --         1
 Dmin         *0         *0         --         --
 Dmax          310        290       --         --
 LUT          *Visual    *Visual    *Visual    *Visual
 Polarity     *Positive  *Positive  *Positive  *Positive
 BorderFill   *On        *On        *On        *On
 Background   *00/00/00  *00/00/00  *00/00/00  *00/00/00
 Captions     *On        *On        *On         Off
 Coverage     *Standard  *Standard  *Standard   Fullbleed
 FilmView     *Front     *Front     --         --
 ImageWarning *No        *No        *No        *No

NetworkInfo:
 Ethernet: Auto-detect speed            Additional IP Addresses:
 MAC Address: 00:40:B1:00:01:11          192.168.90.186
 IP Address: 192.168.90.185              192.168.90.187
 Subnet Mask: 255.255.0.0
 Gateway: 192.168.1.1

PrinterFeatureInfo:
 Postscript                Feature status: ENABLED (permanent)
 DICOM Protocol            Feature status: DISABLED (expired)
 HTP Engine                Feature status: ENABLED (permanent)
 Interface: FTP            Feature status: ENABLED (permanent)
 Interface: LPR            Feature status: ENABLED (permanent)
 Image type: TIFF          Feature status: ENABLED (permanent)
 Image type: GIF           Feature status: ENABLED (permanent)
 Image type: DEFF          Feature status: ENABLED (permanent)
 Image type: BMP           Feature status: ENABLED (permanent)
 Image type: PCX           Feature status: ENABLED (permanent)
 Image type: Sun Raster    Feature status: ENABLED (permanent)
 Image type: XWD           Feature status: ENABLED (permanent)
 Image type: SGI RGB       Feature status: ENABLED (permanent)
 Image type: TARGA         Feature status: ENABLED (permanent)
 Image type: JPEG          Feature status: ENABLED (permanent)
 Image type: DICOM         Feature status: ENABLED (permanent)
 Image type: PBM           Feature status: ENABLED (permanent)
 Image type: PGM           Feature status: ENABLED (permanent)
 Image type: PPM           Feature status: ENABLED (permanent)
 Image type: PNG           Feature status: ENABLED (permanent)
 Media size: A             Feature status: ENABLED (permanent)
 Media size: A4            Feature status: ENABLED (permanent)
 Media size: 8" x 10"      Feature status: ENABLED (permanent)
 Media size: 11" x 14"     Feature status: ENABLED (permanent)
 Media size: 14" x 17"     Feature status: ENABLED (permanent)
 Media type: DV Film       Feature status: ENABLED (permanent)
 Media type: DV Paper      Feature status: ENABLED (permanent)
 Media type: CV Media      Feature status: ENABLED (permanent)

>> Status complete.  Hit <Enter> to logout... <<
```

Viewing the Main Log

To view the continual output of the imager's main log, log in to the imager as **log**. The log entries are displayed, with the latest added in real time.

To stop the logging display and exit the session, press the Control-C keys at your workstation.

Sample Main Log Listing

Following is a sample main log listing.

```
tail: /home/waycool/wcsw/data/dcf/tmp/log/PrintSCP.2298.log: No such
file or directory
Jul 16 11:38:38 horizon : PrinterStatusServer[1370]: Entering main event
loop...
Jul 16 11:38:38 horizon : J-DicomPrintServer[2297]: Process state updated
to RUNNING
Jul 16 11:38:39 horizon : J-DicomPrintServer[2297]: Server is up ...
Jul 16 11:38:39 horizon : J-DicomPrintServer[2297]: WC_PrinterDevice: the
constructor of WC_PrinterDevice is called
Jul 16 11:38:39 horizon : J-DicomPrintServer[2297]: WC_PrinterDevice:
looking for a job
Jul 16 11:38:46 horizon : J-EngineController[1744]: Process state updated
to RUNNING
Jul 16 11:38:46 horizon : J-EngineController[1744]: Entering main event
loop...
Jul 16 11:38:46 horizon : Kdu Controller[1945]: KDUC - KDU Controller
started
Jul 16 11:38:46 horizon : Kdu Controller[1945]: Process state updated to
RUNNING
Jul 16 11:38:46 horizon : Kdu Controller[1945]: Entering main event
loop...
/home/waycool/wcsw/include/Kduc.idl will be loaded into the Interface
Repository.
/home/waycool/wcsw/include/Kduc.idl:3: WcTypes.idl: No such file or
directory
/home/waycool/wcsw/include/Kduc.idl is loaded into the Interface
Repository.
DSP Logger started
~/wcsw/data/dcf/tmp ~/wcsw/bin
~/wcsw/bin

~/wcsw/data/dcf/tmp/log ~/wcsw/bin
~/wcsw/bin
Timeout waiting for DCF to initialize.
snapshot command is: tar czf /etc-backup-1/smartcard-2.tgz
var/home/waycool/wcsw/data/services/NonVolatileData
changing to directory: /etc
Jul 16 16:21:33 horizon : CS-MediaInfoServer[1284]: Parameters requested
for:
WC::MediaCombination(WC::MediaType.MT_DVFILM_BLUE,WC::MediaSize.MS_14X1
7,WC::MediaOrientation.MO_PORTRAIT,0,WC::RibbonType.RT_UNASSIGNED,WC::R
ibbonSize.RS_UNASSIGNED,0) in location WC::EngineSupplySlot.ESS_SLOT_3
```

Viewing the DICOM Attributes Log File

The DICOM Attributes log file displays a log of the DICOM protocol communication between sending hosts and the imager. This allows you to view the print instructions and settings that are being included in DICOM print jobs.

You access the log file from the web-based DCF (DICOM Connectivity Framework) Operation utility.

To view the DICOM Attributes log file

1. From a workstation on the same network as the imager, open a web browser and enter the imager's IP address as the URL.

   You are prompted for the imager login and password

2. Log in as **service**.

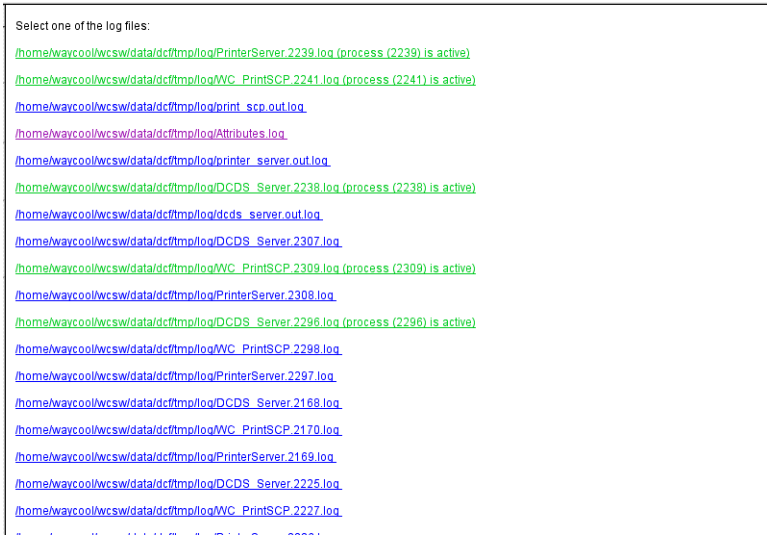
NOTE: *For security reasons, you should change the* ***service*** *login's default password as soon as possible. This can be done using the standard UNIX administration tools, available on the imager.*

The DCF utility home page displays.

DCF Operations Window
Click on a link to perform the corresponding action.
Check System Status
View Log Files
Shutdown DCF Processes
Clear Log Files
Start DCF Processes
Set Startup Debug Flags
Restart DCF Processes
Set Process Debug Flags
This page configured for user: root on Tue Jul 16 11:38:23 2002
Comments or suggestions to support@laurelbridge.com

3. Click on the View Log Files link.

   The log file listing displays.



4. Click on the /.../Attributes.log link.

   The Attributes log displays.

NOTE: *You can also run a text-based version of the DCF utility by opening a terminal session on the imager, logging in as* ***service****, and entering the command* **`dcmstat`**. *The text browser will have the same functions as the web-based version.*

Sample DICOM Attributes Log Listing

Following is a sample Attributes log listing.

```
[ INFO 2004/02/16 16:57:54.361 PrinterServer.2354/OEMPrinter:main ]

OEMPrinter: set system ready flag to true.

[ INFO 2004/02/16 16:57:54.507 PrinterServer.2354/PrinterServer:main ]

Printer_Server initialization complete.
Accepting requests.

[ DEBUG 2004/02/16 16:59:29.516 PrinterServer.2354/OEMPrinter:Thread-4 ]

J-DicomPrintServer.processJob: job description:
```

```
=====================================================================
print job description:
=====================================================================
job_instance_uid = 1.2.840.114089.1.1.17484122.1026853168.3843.6
job_id = 1
config_info = selected_config = /apps/wc/WC_PrintSCP
=====================================================================
dicom association info
=====================================================================
calling_ae_title = genoa_pc
called_ae_title = Print_SCP
calling_presentation_address = 10.1.90.220
called_presentation_address = 10.1.90.201
calling_implementation_class_uid = 1.2.840.113663.1
called_implementation_class_uid = 1.2.840.114089.1.1.0.1.5.0
calling_implementation_version_name = Tiller_v100a
called_implementation_version_name = DCF 1.5.0b
calling_max_pdu_length = 16384
called_max_pdu_length = 16384
    ===================================================================
    requested presentation context
    ===================================================================
    id = 1
    abstract_syntax = 1.2.840.10008.1.1
        proposed transfer_syntax #0 = 1.2.840.10008.1.2
    ===================================================================
    requested presentation context
    ===================================================================
    id = 3
    abstract_syntax = 1.2.840.10008.5.1.1.9
        proposed transfer_syntax #0 = 1.2.840.10008.1.2
    ===================================================================
    accepted presentation context
    ===================================================================
    id = 1
    abstract_syntax = 1.2.840.10008.1.1
    transfer_syntax = 1.2.840.10008.1.2
    ===================================================================
    accepted presentation context
    ===================================================================
    id = 3
    abstract_syntax = 1.2.840.10008.5.1.1.9
    transfer_syntax = 1.2.840.10008.1.2
=====================================================================
film session:
=====================================================================
copies =            1
print_priority = MED
medium_type = PAPER
film_destination = PROCESSOR
film_session_label =
memory_allocation =
owner_id =
    ===================================================================
    film box #0
    ===================================================================
    f_color = false
    image_display_format = STANDARD\1,1
    annotation_display_format_id =
    film_orientation = PORTRAIT
    film_size_id = 8INX10IN
    magnification_type =
    smoothing_type =
    border_density = 300
    empty_image_density = 300
    min_density = 0
```

```
    max_density = 300
    trim =
    configuration_info = config
    illumination = -1
    reflected_ambient_light = -1
=====================================================================
        image box #0

=====================================================================
        image_position = 1
        polarity =
        magnification_type =
        smoothing_type =
        requested_image_size = -1.0
        persistent_id =
/home/waycool/wcsw/data/dcf/tmp/1.2.840.114089.1.1.17484122.1026853168.
3843.5.dat
        persistent_info = link to DICOM file created by DCF WC
        implementation IDS adapter

=====================================================================
        image_header:

=====================================================================
        samples_per_pixel = 1
        photometric_interpretation = MONOCHROME2
        planar_configuration = 0
        rows = 363
        columns = 512
        pixel_aspect_ratio = 1\1
        bits_allocated = 8
        bits_stored = 8
        high_bit = 7
        pixel_representation = 0
```

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Log Files and Status Information

There are several calibrations that are performed to optimize the image quality on printed sheets given variations in media and operating conditions:

- Film calibration is performed automatically by the imager when a **DirectVista** grayscale film cassette is inserted into the imager for the first time. You can also perform this calibration manually.
- Internal densitometer calibration allows you to recalibrate the imager's internal densitometer, which is used to read optical densities when a **DirectVista** grayscale film calibration is performed.
- Thermal print head calibration creates a characterization of the thermal print head to compensate for non-uniformities in the imaging properties of the print head.
- Print length calibration corrects for images running off or printing short of the bottom of a sheet.

All of calibration procedures are covered in this chapter except the film calibration procedure, which is covered in the *Horizon Imager User's Manual*. At the end of this chapter there is also a topic about the automatic compensations made by the imager.

Internal Densitometer Calibration

The Horizon imager includes an internal densitometer that is used to read optical densities when a **DirectVista** grayscale film calibration is performed. The internal densitometer is factory-calibrated to match industry standards. However, you can recalibrate it to match an external reference, such as a bench-top medical densitometer, by performing a simple, three-step procedure.

1. Print a calibration test print.
2. Read and record the density values of the blocks on the print, using the external reference.
3. Enter the readings into the imager at the imager control panel.

NOTE: *For most users, there is no need to perform the internal densitometer calibration. It should be done only if your quality control system requires strict control of absolute image densities. It should then be done according to your needs and quality control schedule. Internal densitometer calibration is a separate operation from film calibration, which is done automatically by the imager for each* ***DirectVista*** *film cassette.*

Calibrating for Blue and Clear Film

The imager stores separate calibration data for blue and clear **DirectVista** grayscale film. If you use both types of film, you should calibrate the densitometer twice—once for each film type. If you use only one film type, then you need to calibrate only once, using that type.

Printing a Calibration Test Print

To print a calibration test print

1. Make sure a cassette of the **DirectVista** grayscale film type that you want to calibrate is inserted in the imager.
2. At the imager's control panel, press and hold the ◀ key, and while holding, it press the MENU key.

   The Main Menu with administrative options displays.
3. Select the following menu options:

   Utilities
   Densitometer Calibrate
   Calibrate
   Calibration Print

   A list of the currently inserted cassettes displays.
4. Press the ▲ and ▼ keys to select the cassette that contains the **DirectVista** grayscale film type to be calibrated, then press the ENTER key.

NOTE: *The selected cassette must contain* ***DirectVista*** *grayscale film.*

A calibration test print is printed and the density blocks on the print are read by the internal densitometer. A sample print is shown in Figure 19-1 on page 19-4.

You can now take the external reference density readings.

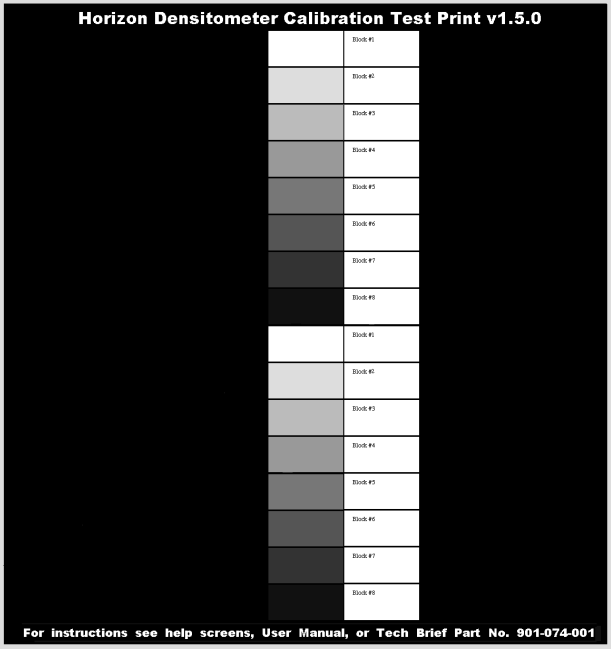


Figure 19-1. Sample Internal Densitometer Calibration Test Print

Measuring and Recording Density Block Readings

As shown in the sample test print in Figure 19-1 on page 19-4, there are two redundant sets of eight density blocks. After you enter the density readings, the imager averages the two readings from corresponding pairs of blocks to determine the new calibration values.

To take the density readings

1. Make sure that the external densitometer is calibrated, nulled, and working properly.
2. Measure the density of each of the 16 blocks on the test print using the external densitometer.
3. Record the density reading for each block in the accompanying clear box on the calibration sheet with a permanent marker.

You are now ready to enter the recorded density values into the imager.

Entering Density Values into the Imager

To enter the density values

1. At the imager's control panel, press and hold the ◀ key, and while holding it, press the MENU key.

   The Main Menu with administrative options displays.

2. Select the following menu options:

   Utilities
   Densitometer Calibrate
   Calibrate
   Calibration Data

   A list of the density block values displays. Bold square change brackets surround the value that can currently be modified.

NOTE: *The values initially displayed on the screen do not indicate the currently stored values. They are only approximations of expected values to assist you with entering the measured densities. Future versions of the imager software may display the actual stored values.*

Calibration Data			
Blk 1:	[0.18]	**Blk 2:**	0.28
Blk 3:	0.71	**Blk 4:**	1.47
Blk 5:	2.28	**Blk 6:**	2.92
Blk 7:	3.22	**Blk 8:**	3.24
Blk 9:	0.18	**Blk 10:**	0.29
Blk 11:	0.74	**Blk 12:**	1.53
Blk 13:	2.35	**Blk 14:**	2.99
Blk 15:	3.24	**Blk 16:**	3.25
Set density for block 1			
Old value: 0.18			
UP/DOWN to alter value, LEFT/RIGHT to move to other block.			
Press MENU to exit menus			

3. Use the ▲ and ▼ keys to increment/decrement the value in the change brackets to the recorded value. Then use the ▶ key to move the change brackets to the next block value (or use the ◀ key to move to the previous block value).

4. When you are done entering all 16 values, press the ENTER key.

   The imager will automatically recalibrate all affected film cassettes of the same type as the test print. The film will be calibrated using the new densitometer calibration data (unless the Auto Film Calibrate option has been turned off).

Resetting Density Values to the Factory Settings

To reset the density values to their factory default settings

1. At the imager's control panel, press and hold the ◀ key, and while holding it, press the MENU key.

   The Main Menu with administrative options displays.

2. Select the following menu options:

   Utilities
   Densitometer Calibrate
   Calibrate
   Reset Calibration

   A message prompts you to confirm that you want to reset all densitometer calibration data to the factory settings.

3. Press the ENTER key to confirm the reset operation.

   The imager will automatically recalibrate all affected film cassettes using the factory densitometer calibration data.

Thermal Print Head Calibration

The Horizon imager compensates for non-uniformities in the imaging properties of the thermal print head. The imager has built-in software and hardware to characterize the thermal print head to perform this compensation.

At the factory, high- and low-frequency thermal print head calibrations are performed, and the results are saved internally in the imager.

You can also perform the high-frequency calibration from the control panel. The thermal print head calibration, which can take up to 45 minutes, automatically pauses printing and takes the imager offline.

You should perform the thermal print head calibration every 5000 sheets or 12 months, whichever comes first.You also might want to perform the thermal print head calibration if prints have vertical streaks or bands, and cleaning the thermal print head does not fix the problem.

CAUTION The thermal print head calibration may affect image quality. It should be performed only according to the schedule stated above, or if cleaning the print head does not fix vertical streaks or bands on printed sheets.

CAUTION Do not perform the thermal print head calibration if the operating temperature is greater than 29ºC (84ºF).

To calibrate the thermal print head

1. At the imager's control panel, press and hold the ◀ key, and while holding it, press the MENU key.

   The Main Menu with administrative options displays.

2. Select the following menu options:

   Utilities
   Print Head Calibrate
   Calibrate

   A message indicates how long the calibration will take, and prompts you to confirm that you want to proceed.

3. Press the ENTER key to proceed with the calibration (or the CANCEL key to cancel it).

NOTE: *Printing will not occur during calibration, and the thermal print head operation cannot be cancelled once it is started.*

Messages at the control panel will indicate when the calibration has been completed.

Resetting Thermal Print Head Calibration to the Factory Settings

To reset the thermal print head calibration to its factory settings

1. At the imager's control panel, press and hold the ◀ key, and while holding it, press the MENU key.

   The Main Menu with administrative options displays.

2. Select the following menu options:

   Utilities
   Print Head Calibrate
   Reset Calibration

   A message prompts you to confirm that you want to reset the calibration data to the factory settings.

3. Press the ENTER key to confirm the reset operation.

   The thermal print head calibration data is reset to its factory settings.

Print Length Calibration

Print length calibration can be performed to correct for images running off or printing short of the bottom of a **DirectVista** film sheet.

NOTE: *Print length calibration is done at the factory and will not typically be required for normal use of the imager. It should be performed only if you notice that images are running over the bottom edge of the sheet, or are printing short of the bottom edge.*

NOTE: *It is normal to have a 3- to 4-mm (about 0.15-in.) unprinted margin at the bottom of a film. This is needed to accommodate film skew, differences in film length, and other factors. This will be slightly larger for 8 x 10 film to accommodate the notch.*

To perform a print length calibration

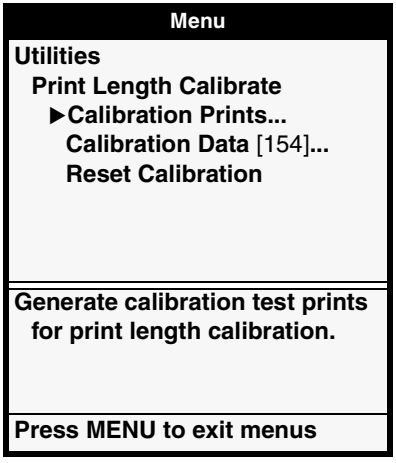
1. At the imager's control panel, press and hold the ◀ key, and while holding it, press the MENU key.

   The Main Menu with administrative options displays.

2. Select the following menu options:

   Utilities
   Print Length Calibrate

   The Print Length Calibrate menu displays.



3. Select the **Calibration Prints** option.

   The imager prints three sheets: an Instruction sheet, a Ruler sheet, and a Calibration sheet.

4. Follow the directions on the Instruction sheet.

   The instructions explain how to use the Ruler and Calibration sheets to determine a calibration number that you will enter using the **Calibration Data** menu option.

CAUTION Make sure you enter the correct calibration data. Entering incorrect calibration data might damage the imager.

Resetting Print Length Calibration to the Factory Setting

To reset the print length calibration to its factory default setting

1. At the imager's control panel, press and hold the ◀ key, and while holding it, press the MENU key.

   The Main Menu with administrative options displays.

2. Select the following menu options:

   Utilities
   Print Length Calibrate
   Reset Calibration

   A message prompts you to confirm that you want to reset the calibration data to the factory setting.

3. Press the ENTER key to confirm the reset operation.

Automatic Compensations

Thermal Effects

The imager automatically compensates for thermal changes that occur during the printing process. For example, the temperature of the system will rise slightly during the printing process.

Sensitometry Compensation

The imager compensates for the sensitometry of the media, ribbon, and characteristics of the print engine. The imager automatically identifies (via the supply cassette and ribbon barcodes) the media version to allow for different emulsion formulations and applies the appropriate sensitometry table.

If the LUT parameter is set to **Visual** (which is the normal setting), the imager will try to produce prints that, with nominal gamma and contrast settings, will produce a visually uniform output. That is, a ramp of steps in the original image that has linearly-spaced digital values will produce densities that visually appear to be uniformly spaced by a "standard observer."

NOTE: *The LUT parameter should normally be set only to* ***Visual****. Other settings, such as* ***Linear*** *or custom settings, should be used only if recommended by the manufacturer of an imaging device or application that is a source for image print jobs.*

A

Supported Media

The Horizon imager supports a variety of paper/white film and film for both grayscale and color prints. Not all Horizon imager configurations support all media types and sizes. If your Horizon imager does not support the media type and/or size you want to use, contact your Codonics representative.

The following table shows the currently supported media size/type combinations:

Media Type	Size	Catalog Number
DirectVista Paper/White Film	8 x 10 in.	810-DVP
	A (8.5 x 11 in.)	A-DVP
	A4 (210 x 297 mm)	A4-DVP
	11 x 14 in. (28 x 35 cm)	1114-DVP
	14 x 17 in. (35 x 43 cm)	1417-DVP
DirectVista Film Blue	8 x 10 in.	810-DVB
	11 x 14 in.	1114-DVB
	14 x 17 in.	1417-DVB
	14 x 36 in.	1436-DVB
	14 x 51 in.	1451-DVB
DirectVista Film Clear	8 x 10 in.	810-DVC
	11 x 14 in.	1114-DVC
	14 x 17 in.	1417-DVC
ChromaVista Paper/White Film	8 x 10 in.	810-CVP
	A	A-CVP
	A4	A4-CVP

NOTE: *Some of the media type/size combinations listed here may not currently be available.*

DirectVista grayscale media is orderable by the case, at 5 cassettes per case, with 100 sheets of film per cassette and 80 sheets of paper/white film per cassette.

ChromaVista color paper/white film is available in packages that contain 2 media cassettes and 1 color ribbon. **ChromaVista** cassettes contain 50 sheets of media.

To order media, contact Codonics at:

Phone: **440-243-1198**
Toll Free: **800-444-1198**
Fax: **440-243-1334**
Web: **www.codonics.com**

B

System Job Settings Files

The table on the following pages lists the system Job Settings files that come with the Horizon imager. Note that there is a system Job Settings file for each supported media type and size combination. As such, they contain only the Media Type and Media Size parameters.

The DefaultGrayscale and DefaultColor system Job Settings files contain no sheet or image parameters and, if used, cause the imager to default to the Default User Settings for Grayscale and Color, set at the control panel.

System Job Settings File	Corresponding Use
Print_SCP	Used for DICOM. Does not contain any print parameter settings. If the media type or size is not included in the DICOM attributes sent to the imager, the imager detects the image type and selects the media type and size as follows: • For grayscale images, uses the media set for Grayscale in the Default Media menu at the control panel. • For color images, uses the media set for Color in the Default Media menu at the control panel.
DefaultGrayscale	Imager uses the media set for Grayscale in the Default Media menu at the control panel
DefaultColor	Imager uses the media set for Color in the Default Media menu at the control panel
8x10-dvf	8x10 **DirectVista** film (blue)
8x10-dvfb	8x10 **DirectVista** film (blue)
8x10-dvfc	8x10 **DirectVista** film (clear)
8x10-dvp	8x10 **DirectVista** paper/white film
8x10-cvf	8x10 **ChromaVista** white film
8x10-cvt	8x10 **ChromaVista** white film
11x14-dvf	11x14 **DirectVista** film (blue)
11x14-dvfb	11x14 **DirectVista** film (blue)
11x14-dvfc	11x14 **DirectVista** film (clear)
11x14-dvp	11x14 **DirectVista** paper/white film
14x17-dvf	14x17 **DirectVista** film (blue)
14x17-dvfb	14x17 **DirectVista** film (blue)
14x17-dvfc	14x17 **DirectVista** film (clear)
14x17-dvp	14x17 **DirectVista** paper/white film
14x36-dvf	14x36 DirectVista film (blue)
14x36-dvfb	14x36 DirectVista film (blue)

System Job Settings File	Corresponding Use
14x51-dvf	14x51 DirectVista film (blue)
14x51-dvfb	14x51 DirectVista film (blue)
a-dvp	A-size **DirectVista** paper/white film
a-cvp	A-size **ChromaVista** paper/white film
a4-dvp	A4-size **DirectVista** paper/white film
a4-cvp	A4-size **ChromaVista** paper/white film
priority-high	Sets print job priority to high
priority-medium	Sets print job priority to medium
priority-low	Sets print job priority to low
receive-1	Forces sheet output to receive tray 1
receive-2	Forces sheet output to receive tray 2
receive-3	Forces sheet output to receive tray 3
syngofilm	Special OEM-specific job settings

C

Parameter Names in Job Settings Files

The table on the following pages lists the valid names for the job, sheet, and image parameters—and their possible setting values—that you use to specify the parameters in the Job Settings text files.

For a complete explanation of the parameters, refer to Chapter 6.

Note that parameters and values are not case sensitive (for example, **MEDIASIZE** is equivalent to **mediasize**). Values need only be specified with as many characters as required to ensure uniqueness, although the minimum is 3 characters (for example, **BIL** is equivalent to **BILINEAR** for the Scale parameter). The exception is that the Mediasize values must be spelled out completely.

Name at the Control Panel	Name to Use in Text File	Valid Values
Job Parameters		
Media Size	mediasize	A A4 8x10 11x14 14x17 14x36 14x51
Media Type	mediatype	cvpaper dvpaper paper (mapped to dvpaper) dvfilmblu dvfilmclr dvfilm (mapped to dvfilmblu)
Priority	priority	low medium high
Receive Tray	receivetray *or* bin	1 2 3
Sheet Parameters		
Background	background	*rr*/*gg*/*bb*, where *rr*, *gg*, and *bb* are 2-digit hexadecimal values from 00 (black) to FF (full color), which represent red, green, and blue respectively.
Border Fill	borderfill	on off
Captions	captions	on off
Coverage	sheetcoverage	standard fullbleed np
Dmax	dmax	100 to 400
Dmin	dmin	0 to 100

Name at the Control Panel	Name to Use in Text File	Valid Values
Film View	filmview	front back
Image Warning	decimatewarn	on off
LUT	lut	visual linear custom1 through custom9
Image Parameters		
Contrast	contrast	-100 to 100
Gamma	gamma	0.05 to 10, in increments of 0.05
MCM	mcm	0 = MCM disabled 1 = Sony Trinitron 2 = ViewSonic G810 3 = NEC MultiSync 1880SX 4 = NEC MultiSync 1880SX Alternate 1 5 = Sony Trinitron Alternate 1 6 = NP-1600 MCM 6 Equivalent 7 = ViewSonic G810 Alternate 1 8 = Sun Monitor 1 9 = 3D rendering, CRT Monitors 10 = 3D rendering, LCD Monitors 11 = 3D rendering, NEC LED Monitors 12 to 17 = future use 100 to 999 = OEM-specific custom settings
Nudge Image	nudge	Horizontal *x* Vertical *x* where *x* is an integer from –20 to 20 representing increments of 0.1 mm; for example, 10 = 1 mm.
Polarity	polarity	positive negative

Name at the Control Panel	Name to Use in Text File	Valid Values
Rotate	rotate	never always auto
Saturation	saturation	-100 to 100
Not supported in control panel	tcr	0 to 100 (For NP-series imager compatibility, TCR values will be mapped to Saturation values from 0 to -100.)
Scaling	scale	box bilinear mitchell bicubic lanczos sharp1 sharp2 sharp3

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